The

# Electrical Review

VOL. CI. JULY 1, 1927. No. 2,588.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

*Chairman:* H. ALABASTER

*Technical Editor:* A. H. ALLEN, M.I.E.E. *Joint Managing Directors:* G. H. ALABASTER. E. A. GATEHOUSE M.I.E.E., A.M.INST.C.E. *Commercial Editor:* A. H. BRIDGE.

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OFFICE: 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEEKAY, CENT., LONDON," Code, A B C. Telephone No.: Central 7672 (Three Lines).

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 6d.; Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, LIMITED, and crossed "Midland Bank, Newgate Street Branch."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

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# The Contractors' Convention.

THE E.C.A. Allied Associations are to be congratulated upon the undoubted success of their second annual convention which was held at Scarborough last week. The attendance was very good in relation to the membership; the papers and addresses were full of "meat"; and the social functions were admirably arranged and carried out. While the Associations were happy in their choice of a meeting place, they were unfortunate in selecting three rather bad days as far as weather was concerned, but for that no blame attaches to them.

The President's report made particular reference to trading relations with other sections of the electrical industry, some of which it was obvious had not developed satisfactorily, and he threw out a hint that the Associations would not hesitate to bring their augmented strength to bear where negotiations proved fruitless. It might be thought that this was not the most conciliatory of suggestions, but Mr. Miles seemed to desire, that attitude notwithstanding, that the Associations should not be regarded as aggressive, though it was sometimes found that attack was the best means of defence.

The "agreed clause" also received attention, and references were made to it in later discussions. Much is expected to issue from the fact that the men who negotiated the clause are for the most part members of the statutory committee set up to administer it. It is certain that the committee's task will be no sinecure; with tolerance and patience, however, it should be able to secure the support of all parties in working out its decisions.

Mr. Grierson's paper showed the need for some uniformity in specifications; six sets of rules exist, but none of these is properly applicable to the electrical installation industry, and one at least loads the dice against the contractor. This, obviously, is a matter upon which the Associations themselves will have to deliberate. The existing E.C.A. model contract is said to be inapplicable to large installations, while the I.E.E. form is unsuitable for the opposite reason.

Another of the contractor's bugbears, price-cutting,

was dealt with by implication in Mr. Kirkham's paper on costing. The author aimed at showing that if proper methods were adopted by all tenderers, the astounding difference which is sometimes observed between the highest and lowest offers could not occur. He indicated, moreover, that the net profit in the electrical contracting industry was lower than in the building trade, and emphasised the inadequacy of the margin shown by the former. It must be said that his charts showed the return on *turnover;* an indication of the proportion of the profit to the *capital employed* would have been interesting and perhaps fairer.

The paper which raised an oblique discussion of the municipal trading question was that by Mr. Walker on electrical showrooms. Mr. J. Orringe spoke of the harmonious relations which existed between the supply authority and the contractors at Leicester, and advocated similar methods for the smaller towns. Mr. R. Robson mentioned the problem of financing "easy-payment" systems, and said that the E.C.A. had had the matter under consideration. He hinted that it might one day provide a financing scheme itself. Two manufacturers' representatives who spoke suggested closer co-operation between local contractors; one of them (Mr. Shelton) even suggested that the pooling of all their resources was worthy of consideration by the E.C.A.

It is to be regretted that the "guillotine" had to be applied to the discussions on the two papers read last Friday. Many of those present who had something to say were precluded from saying it, and the discussions were thus not thoroughly representative. It seemed almost a pity that some of the surplus time set apart for another paper on the preceding day could not be brought over to the Friday.

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**The Campaign Report.**

ELSEWHERE in this issue we give some extracts from the independent report on the Wiring of Britain or Better Lighting Campaign which occupied most of us more or less strenuously during the greater part of last autumn and winter. The report, which was prepared by Lieut.-Col. W. A. Vignoles and Mr. R. W. Kennedy, indicates how valuable has been the co-operation of the different interests in local areas, and how well these separate bodies or circles worked in co-operation with the Central organisation or headquarters of the movement. The figures alone show the gigantic scale upon which the campaign was carried through, but they can only convey a vague impression of the great influence that the effort must have exercised upon the mind of the public. Education of the public on mass lines was the objective, and as we have said again and again, the results in many directions could not be expected to show themselves immediately. The bread cast upon the waters will return in some cases after many days, or, in the words of the reporters, "valuable electrical impressions . . . are bound to be translated into business." The general effect upon the whole electrical industry was unquestionably beneficial, and the bringing together of various sections interested in local activities cannot but help "to promote the common electrical good." Let us hope that nothing will arise to prevent a continuance of the "local spirit of co-operative amity" which the campaign has produced. To achieve this spirit, Messrs. Vignoles and Kennedy remark, "was worth more than the whole cost of the campaign."

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**The D.O.T. and Foreign Competition.**

ANY further criticism of the Government attitude toward the Department of Overseas Trade may be thought superfluous in view of the statements that have been made during the past ten days indicating that the matter is still under consideration. Ever since the Chancellor of the Exchequer made his first announcement in the House of Commons it has been difficult to deal with the subject satisfactorily, because actual intentions have been shrouded in mystery, suggesting that though the Government wanted to do something, it could not make up its mind what that something was to be. The situation has been cleared from the Government point of view by the very emphatic statements that have been made from authoritative trade and industrial sources. Neither this nor any other Government that wished to help the trade of the country could persist in its false economy policy of shutting down national business-getting activities after all that it has been told about the energetic way in which competing industrial nations are developing their Government services in support of foreign trade. We drew attention to this aspect of the matter recently and quoted important references from writers in other countries; but nothing that has been said is likely to carry so great weight as the striking letter contributed to *The Times* of June 24th by Mr. Gilbert C. Vyle, the President of the Association of British Chambers of Commerce. He and other members of his Association have just returned from the United States. One conclusion that he has reached as a result is that he is more convinced than ever that the suggestion to make a drastic change in the status of the D.O.T. is most unwise. He finds that "the American Government is expanding its Bureau of Foreign Commerce, which . . . is in no small degree modelled on our own British Department." "The American Government attaches great value to the Bureau, and increasing sums, far in excess of British expenditure, are being spent upon it." He goes on to say that American export trade is rapidly increasing, and concludes with these words: "We must face the fact that our great industrial and commercial rivals in America are pressing forward for a world trade, and it is an obligation on this country and those responsible for its Government to see that we do not lag behind." If anything can be done to improve the efficiency of the Department by means of economical reorganisation, well and good. Business men, as Mr. Vyle remarks, are quite alive to the meaning of the word "economy," but "there is such a thing as being penny wise and pound foolish."

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**The Lighting of Printing Works.**

THE discussion on the above subject, appropriately staged by the Illuminating Engineering Society at the Stationers' Hall, on June 14th, served a useful purpose in giving publicity to the important investigations being undertaken by the committee working under the Department of Scientific and Industrial Research. The main conclusion so far reached—that an illumination of the order of 20 foot-candles is necessary for the full efficiency of typesetting by hand—has already appeared in the technical report issued by the Committee, but in a paper read before the Society, of which an abstract appears elsewhere in this issue, Mr. Weston was able to give some account of subsequent investigations on the effect of direct and indirect lighting, and the use of daylight lamps. There seems reason to think that a modified form of artificial daylight has some advantages, whilst semi-indirect lighting may prove helpful in diminishing the troublesome glitter of new type, referred to in the discussion. These are points which must be left to the final decision of experts. The outstanding fact emerging from this investigation is the direct benefit of adequate illumination, and it was freely conceded that the lighting in many printing works ought to be brought up to a higher standard. There is good reason to think that this conclusion applies to other industries, and we hope that the Committee will be encouraged to extend its inquiry to other fields of industrial work. In this investigation the sympathetic co-operation of the Joint Industrial Council for the Printing Trades was a most important factor. We hope that employers in other industries will show the same enlightened attitude to this question of proper lighting.

# The Institution of Electrical Engineers.

## Summer Meeting at the North-Eastern Centre.

(*Concluded from page* 1006.)

VISITORS to the Ford Potteries and the Armstrong College Library on the Thursday afternoon were entertained to tea at the Grand Assembly Rooms by the directors of the Newcastle and District Electric Lighting Co., Ltd., whilst two other parties partook of tea at the Wallsend shipyard and the Gateshead works of Messrs. Clarke, Chapman and Co., Ltd., which cover over 14 acres. The origin of the firm dates back to 1864, and its reputation for the manufacture of marine auxiliary plant, both steam and electrically driven, is world-wide. Other products appertain to power stations and collieries, one of the latest being a turbo-pulveriser, and the works' steam-raising plant well repays inspection: it consists of a Clarke, Chapman (Woodeson patent) water-tube boiler fired entirely with pulverised coal on the "Unit" system, and is capable of evaporating from 40,000 to 50,000 lb. of steam per hour at a pressure of 250 lb. per sq. in. The pulveriser is a simple and economical machine, so arranged that it will powder coal containing a large percentage of moisture without the use of any auxiliary drying apparatus; when pulverising wet coal its power consumption does not exceed 15 kW per ton ground, it is claimed, and is declared to enable the cheapest and lowest-grade fuel, some containing as much as 30 per cent. ash, to be burnt successfully. The boiler installation has been run for considerable periods on coal containing 15 per cent. moisture, and during the period of the coal miners' dispute it was operated on any class of fuel that could be obtained.

Fig. 14.—Some Members of the Local Reception Committee.

The ship-building yards of Messrs. Swan, Hunter and Wigham Richardson, Ltd., at Wallsend and Walker-on-Tyne, have a river frontage of 4,000 ft. and occupy 78 acres; including the Southwick yard at Sunderland, they consist of 26 building berths, the largest of which are capable of accommodating vessels 1,000 ft. long. Over all the large berths electric cranes travel on overhead gantries, and four berths are glass-roofed and electrically illuminated. The capacity of the Tyne and Wear establishments is 150,000 gross registered tons per year, and floating docks of from 400 to 33,000 tons lifting power have been constructed. In addition, the Neptune engine works and boiler shops at Walker have an annual capacity of 60,000 i.h.p., reciprocating steam engines, geared turbines, and marine oil engines being built there. The resources of the Company are indicated by the fact that during the late war 520 ships were repaired at Wallsend; of that total 243 ships were repaired for the Admiralty, including 40 cruisers, 71 torpedo boats and flotilla leaders, and 72 submarine boats. During the week-end prior to the I.E.E. visit the twin-screw meat- and fruit-carrying vessel *Port Huon*, of 11,350 tons deadweight, which the Company has built for the Commonwealth and Dominion Line, Ltd., ran her trial trips successfully in the River Tyne. She is 500 ft. long and, apart from her Sulzer internal-combustion propelling engines, which were built by the Wallsend Slipway and Engineering Co., is an all-electric vessel. All her holds are insulated, and accommodation has been provided for a limited number of passengers; the ship will be able to complete the voyage to Melbourne at 14.5 knots in 34 days, requiring about 27 tons of fuel oil per day, as against 95 tons of coal had she been steam driven.

Figs. 15 and 16.—Outside the Tea Tent at Borcovicus.

On the Thursday evening a reception and dance were given at the Old Assembly Rooms, Newcastle, by the principal of Armstrong College, Sir Theodore Morrison, K.C.S.I., K.C.I.E., C.B.E.

On the Friday morning one party inspected the steel works of the Consett Iron Co., Ltd.; luncheon was provided by the Company. Of the eight blast furnaces, one is 75 ft. high, with a 12 ft. 6 in. hearth: a 7½-ton magnet crane loads "combs" from the "pig" beds into bogies for conveyance to the breakers, whence three 14-ton magnet cranes load the iron into boxes and lift them four at a time in trays on to the charging platform; scrap from the mills is similarly handled. There are six 75-ton acid open-hearth and three 65-ton basic furnaces, served by three 3-ton chargers and three 100-ton ladle cranes in the tapping bay, arranged for alternative producer or coke-oven gas firing, and each has a "Woodeson" waste-heat boiler and induced-draught fan. The gas producers are of the static water-bottom type with motor-driven Chapman agitators, arranged in two batteries of nine each, an inclined railway delivering coal into overhead bunkers. All ingots are cast on cars and, after being stripped from the moulds, are charged into gas-heated soaking pits and then transferred to a tilting chair, whence they are delivered by rollers to the 40-in. slabbing mill, which is driven by a reversing motor of 14,000 b.h.p. at a varying speed of from 50 to 120 r.p.m. The slabs thus produced are cut by steam-hydraulic shears and re-heated in six waste-heat furnaces before being fed to either of two mills. The larger of the latter comprises two stands and rolls plates up to 9 ft. wide by from ¼ to 2 in. thick, being driven by a motor which is a duplicate of that of the slabbing mill. The "Louth" three-high light-plate mill rolls plates from ⅛ to ⅞ in. thick and up to 6 ft. wide; it is driven at 52.5 r.p.m. through reduction gear by an a.c., 5,000-b.h.p., 240-r.p.m. induction motor, and a pair of chequer rollers in this mill's run-out is also driven by an a.c. induction motor of 1,500 b.h.p. The rolled plates pass through a hot straightening machine to cooling banks equipped with turn-over gear, then to cutting shears, &c., and the loading bay, which is served by three 10-ton magnet cranes of 100-ft. span. All the shears, manipulators, screwdown gear, roll racks, skids, &c., throughout the plate mills are electrically driven and operated by automatic controllers.* The angle mills are steam driven, but the material therefrom is handled by 7½-ton magnet cranes, and the auxiliary plant is electrically driven. In addition, a bar mill for producing small sections and guide material comprises a 16-in. roughing mill driven by a 250-h.p. d.c. motor at from 60 to 120 r.p.m. in tandem with a 12-in. finishing mill driven by a 500-h.p. d.c. motor at from 60 to 300 r.p.m. Power is generated from surplus blast-furnace gas, supplemented by coke-oven gas burned under boilers: the station contains two 3,000-kW, 2,400-r.p.m., 3-phase, 40-cycle, 3,000-volt, 0.7 p.f. turbo-generators with surface condensers and cooling towers; it operates in parallel with the system of the Cleveland and Durham County Electric Power Supply Co., the connection being through three 1,600-kVA 3,000/20,000-volt transformers housed 200 yards from the power station, the switchgear being remotely controlled from the latter. General distribution in the works is on the d.c. 500-volt, 3-wire system, three 1,500-kW rotary convertors being supplemented by a 1,000-kW geared turbo-dynamo, besides a 750-kW rotary convertor which connects the works' d.c. network with the Power Co.'s 50-cycle, 5,000-volt, 3-phase colliery system; into the plate mill sub-station, which also contains the motor-generators for the large revers-

Figs. 17 and 18.—Early Arrivals for Tea at Housesteads on the Roman Wall.

Figs. 19 and 20.—Snapshots at Borcovicus, the Site of an Old Roman Camp Fortress.

* See ELEC. REV., June 18th, 1926, p. 902.

ing-mill motors, 3,000-volt a.c. is delivered for the principal plate-mill machines.

The major party proceeded on an excursion on Friday to Hexham, a fine old market town of great antiquity midway between the East Coast and Carlisle. The beautiful Abbey, founded about 674, was built by Wilfred, Bishop of York, a one-time monk of Lindisfarne upon whom the land was bestowed by Queen Ethelreda, amongst its noteworthy features and ancient relics several masonic signs scratched upon stone pillars were noted with interest.

After luncheon at Hexham, at which Mr. W. M. Mordey presided (deputising for the I.E.E. president), both parties met at Housesteads for tea and inspected the site of the old Roman camp of Borcovicus, the return drive to Newcastle being *via* the line of route of the Roman wall, Chollerford and the Western Turnpike.

At the Grand Assembly Rooms a reception was held in the evening by Dr. W. H. Eccles, F.R.S. (President, I.E.E.), and Mrs. Eccles, supported by Mr. J. Rosen (chairman, N.E. Centre) and Miss Rosen, dancing being kept up to a late hour. This being the terminating function of the tour, the President took the opportunity of thanking the various Companies for their hospitality and the facilities afforded for the inspection of their works, and paid tribute to the onerous work of those whose task it had been to organise the tour. To mark the occasion, he presented Mrs. Allan with a silver condiment set and, in returning thanks, Mr. P. F. Allan (hon. sec., N.E. Centre) acknowledged the assistance he had received from the I.E.E. headquarters staff and the local reception committee, some of whom may be recognised in fig. 14. They are to be congratulated upon the thoroughness of the arrangements, which resulted in an enjoyable meeting being successfully carried to its conclusion without a hitch.

In conclusion, it is fitting to record the arrival at the Science Museum, South Kensington, London, of the 45-ft. long afterpart of the *Turbinia*, the first vessel to be driven by a steam turbine. Built at Wallsend in 1894, she attained the "record" speed of 34.5 knots at the Naval review in the Solent in 1897; drawing 3 ft. of water, she was 100 ft. long with a beam of 9 ft., a total displacement of 44.5 tons, and main propelling machinery of 2,000 h.p., but the original turbine, which has also been presented to the museum, was later replaced by three separate machines. The gift to the nation coincided with Sir Charles Parsons's 73rd birthday on June 13th and the conferment upon him, by the King, of the Order of Merit. Tyneside is very proud of that recognition of one of the greatest inventors that district has produced, and when welcoming the I.E.E. to Newcastle-upon-Tyne, the Lord Mayor (Coun. A. W. Lambert, M.C.) who, by the way, unexpectedly revealed himself to be a skilled exponent of the art of community singing, supported the local plea for the retention of the fore part of the vessel in the city of her birth, to which request Sir Charles was pleased to accede.

# 66-kV Transmission Line Regulators.

**A descriptive outline of the "Metrovick" booster and auto-transformers and oil-immersed tapping switchgear installed for the voltage-regulation of a 30-mile, 66,000-V, 24,000-kVA transmission line on the North-East Coast.**

THE Newcastle-upon-Tyne Electric Supply Co. has the distinction of operating the highest-voltage electric power transmission system so far put into use in this country.

In view of the schemes which are now being drawn up under the Electricity (Supply) Act, 1926, for the interconnection of generating stations situated at considerable distances from each other and the transmission of power by high-voltage lines, the following description of the voltage-regulating equipment which is in service at two of the main power stations on the North-East Coast system is of special interest. The consulting engineers for the scheme were Messrs. Merz & McLellan, and the equipment has been supplied and installed by the Metropolitan-Vickers Electrical Co., Ltd.

The transmission scheme includes two 66,000-volt lines, each of 24,000 kVA capacity, connecting the Company's generating stations at Dunston and North Tees, the direct distances between them being about 30 miles. One transmission line, *via* the Stoney-Cut sub-station, near the East Coast, is already in operation; the other line has been completed from Dunston to the Potterhouse sub-station, near Durham, and from North Tees to the Skernside sub-station, near Aycliffe, about six miles north of Darlington, the middle section which remains to be completed being about 14 miles in length (fig. 1).

As the generating voltages of the North Tees and Dunston power stations are 11,000 V and 6,000 V respectively, transformers for the 66,000-V connection have been installed at each end of the lines near each power station, and consist of four 3-phase banks of 4,000-kVA units in each case, so that up to 48,000 kVA can be transmitted in either direction; fig. 3 shows one bank, of the outdoor type, fitted with oil-conservators and temperature indicators and force cooled. The low-voltage connections are brought to the trans-

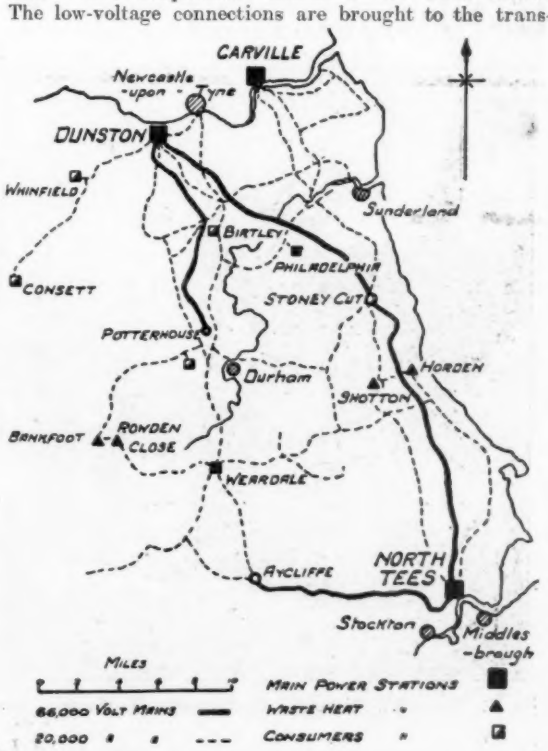


Fig. 1.—Map showing 66-kV Transmission Lines.

former by means of cable connections terminating in an oil-filled cable box; the high-voltage lead is brought out through a condenser bushing-type terminal and connected to overhead bus-bars. The concrete plinths are of a suitable height to enable the transformers to be moved bodily on to trucks on rails between the banks; the force cooling pumping plant is installed in a small building near the transformers.

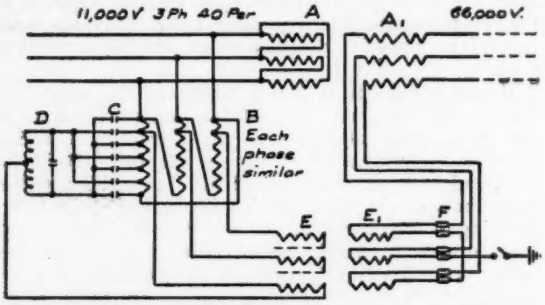


Fig. 2.—Arrangement of Voltage-regulating Equipment at North Tees.

The flow of power is controlled by means of equipment installed at both ends of the lines, each being a combination of a booster-transformer and a voltage-regulating auto-transformer with tapping switches; the auto-transformer is energised from the station bus-bars and by means of the tapping switches supplies the primary winding of the booster-transformer at variable voltage according to the buck or boost required on the 66,000-volt line. The arrangement of the equipment is shown in fig. 2; each equipment is capable of dealing with a 24,000-kVA load, giving a range of from minus 4 to plus 20 per cent. of normal voltage, and by moving connecting links between the regulating and booster transformers, other ranges of boost having the same total variation can be obtained, e.g., it is possible to obtain from minus 8 to plus 16 per cent.; or minus 12 to plus 12 per cent. The voltage variation on all ranges is obtained in steps of 4 per cent., the tappings being selected by means of a small master controller which operates the tapping switches through a system of contactors.

The booster-transformers consist of two 3-phase banks of single-phase units, oil-immersed and self-cooled, at each end of the transmission lines. The voltage-regulating auto-transformers are also single-phase units mounted in the same tanks as the booster-transformers; fig. 4 shows one group in the regulator house, which is immediately alongside the main transformers. Fig. 5 shows the tapping switches of one equipment in the same regulator house; they consist of seven 300-amp., 11,000-volt, 3-pole oil circuit breakers arranged for remote electrical operation, together with an eighth unit of the same type for short-circuiting the tap-changing

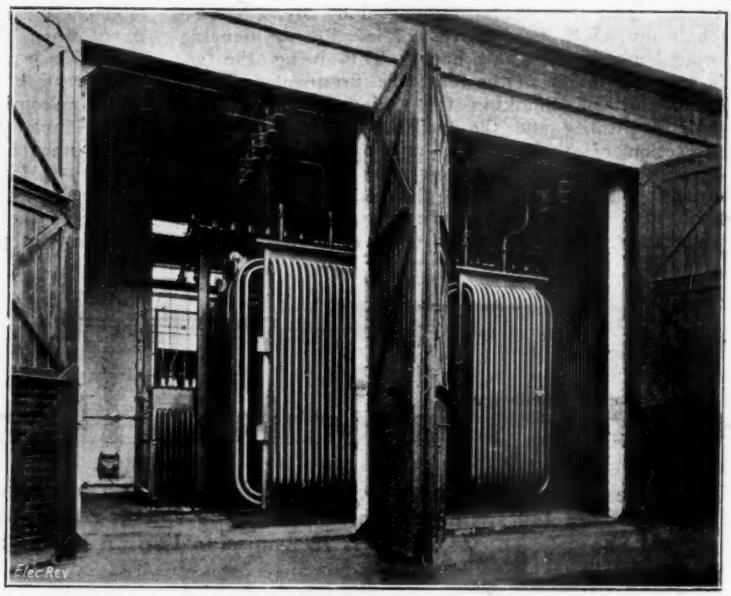


Fig. 4.—Transformers in North Tees Regulator House.

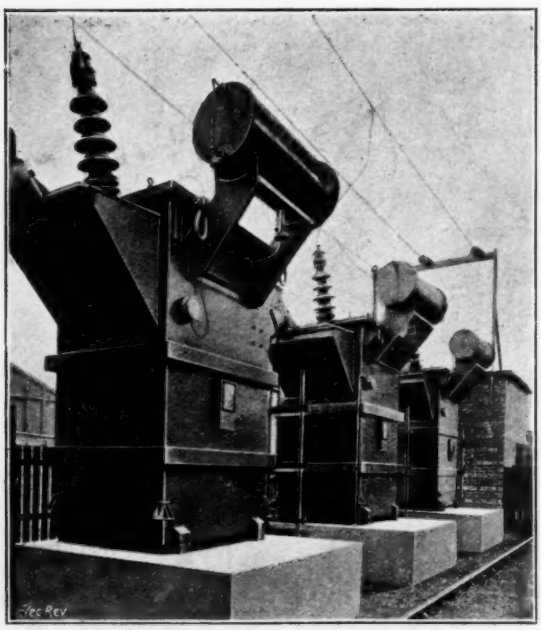


Fig. 3.—Main 66-kV "Metrovick" Transformers at North Tees Station.

reactance mentioned below; they are mounted on frame in such a way as to form a self-supporting arrangement. At the end of the row of switches is the contactor panel (fig. 6), by which the closing circuits of the oil circuit-breakers are controlled. Pilot wires connect the contactors with the master controller (fig. 7), which is mounted in the control room of the generating station at some distance from the regulator house.

Step-by-step regulation without interruption of supply involves the closing of each selected tapping switch before the existing connection on the adjacent tapping switch is broken and, in order that this may be done without short-circuiting that part of the transformer winding which is between the tappings, a reactance (marked D in fig. 2) is connected between the two tapping switches while a change is taking place, this connection being made effective by opening a switch which is normally closed across the reactance. It will be observed from the diagram that when the reactance switch and one tapping switch are closed as in normal working, the load current is divided so as to pass through the two halves of the choke coil in opposite directions, so that the coil has no inductive effect, and therefore produces no reactance drop in the circuit.

The sequence of operations following on a movement of the master controller is entirely automatic; the first is the opening of the reactance switch, rendering the reactance operative; the selected tapping switch then closes and immediately afterwards the superseded tapping switch opens; the change having been effected, the reactance switch re-closes. An important feature of the

arrangement is that the whole sequence of operations is made dependent upon the correct functioning of the reactance switch. Indicating lamps in the control room show at all times which switches are closed and which are open, and an alarm bell commences to ring when tap-changing is started and continues to ring until the sequence of operations involved in the change has been completed. In the event of the lamps or bell indicating that the change has not been correctly completed within the prescribed time (a period of about ten seconds), the operator returns the master controller to its former position, thus re-establishing the connection to the previous tapping, and investigation can then be made to ascertain the cause of the failure; this arrangement enables the supply to be maintained in spite of any temporary disorganisation of the selector arrangement.

Apparatus of the type described forms a reliable and reasonably cheap arrangement when step-by-step regulation is permissible; its application is not limited to interconnecting lines, but is equally suitable for the regulation of feeders and networks of all sizes. For smaller currents and lower voltages, contactors are used instead of oil circuit breakers; the contactors may be either of the ordinary industrial type, or, preferably, of the cam-operated type. With circuit-breakers, or cam-operated contactors, should the supply fail, the apparatus will remain set, and can be operated by hand if necessary; ordinary contactors under the same conditions revert to a safe position of no boost. With either type of equipment, operation may be either semi-automatic, in which case the initiating impulse is given by means of a manually-operated controller; or fully automatic, in which case the impulse is given by a controlling relay.

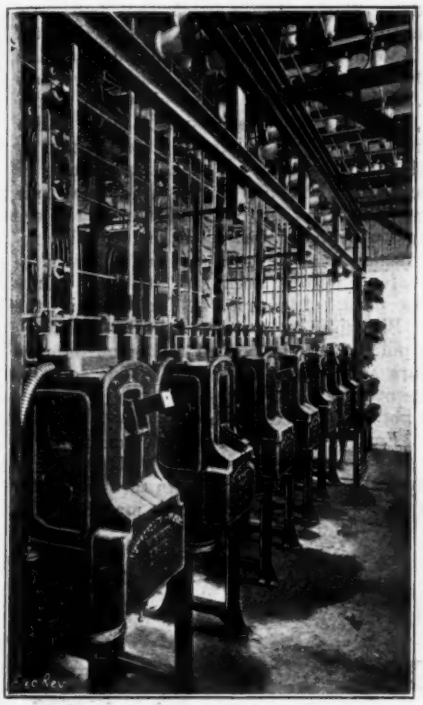

Fig. 5.—Metal-clad Circuit-breakers acting as Tapping Switches; Regulating Transformers in background.

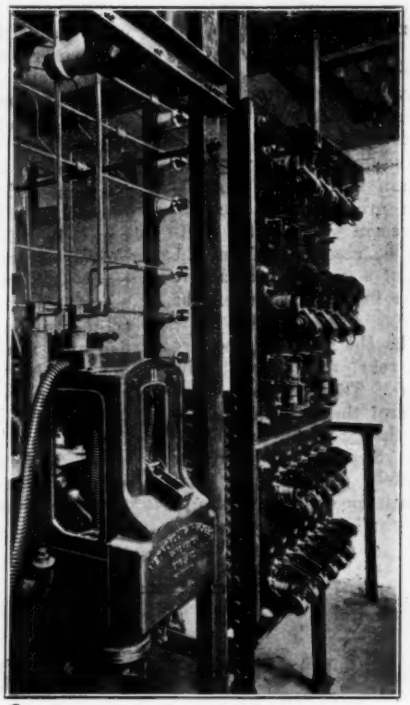

Fig. 6.—Contactor Panel for operating the Tapping Switches.

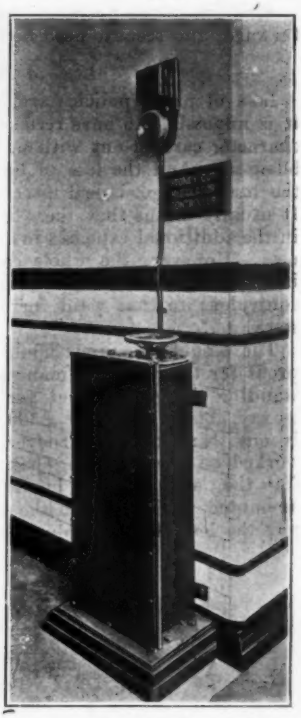

Fig. 7.—Master Controller for Voltage-Regulating Equipment.

# Insurance for the Electrical Trader.

## Some Practical Advice for Security against Losses in Business.

By CHANDOS BIDWELL.

HARD-EARNED money and a carefully-built-up business are things well worth safeguarding. That is why every electrical dealer should give to insurance in all its branches more than passing consideration. Not all the caution in the world can prevent him from being the victim of a devastating fire, a burglary, or a crippling claim for damages, and any one of these things may mean the ruin of his business and practical penury. To insure himself adequately is the dealer's one form of security against these losses. That done, he may work in the secure knowledge that his best efforts will not be brought to the ground by a single unavoidable mishap. Money thus laid out is well spent, and this article is designed to show how readers may most profitably insure their businesses and themselves against all risks.

Policies essential to every trader are fire, loss of profits, burglary, employers' liability, plate glass, personal health, and accident and life. Others to be recommended include public liability, fidelity guarantee, domestic, and so on.

### Fire Insurance.

Only those who own their premises need worry about insuring them against fire. This policy costs our trade about half-a-crown per cent. of the value of the building so long as it is composed of brick and stone roofed with tiles or slates. Only if the adjacent premises are occupied by gasworks, or something similar, will the rate be higher.

More important to most, however, is the insurance of the *stock* against fire. This policy may be effected at a

similar rate per cent. All stock and fittings should be included in the calculation of the amount to be insured, and it is wise to be generous with these figures, for it is better to pay a few additional shillings by way of premium than to suffer a loss of some hundreds of pounds through under-insurance. These policies cover loss by fire, lightning, thunderbolt or explosion of illuminating gas, and damage by water used in extinguishing a fire.

Fire insurance proposal forms are quite straightforward, and seem to need no further comment here.

**Loss of Profits.**

Loss of profit policies are invaluable. After a fire, it is impossible to have reconstructions of even a minor character carried out without losing a portion of one's business. And the loss of half one's customers means the loss of a good deal more than half of one's profit. It usually means that the whole profit is swallowed up in the additional expenses involved in working the business. However, the whole can be recovered from the insurance company on payment of a premium at a rate equivalent to that paid for the fire insurance of the stock.

The amount insured should be the total of the net profit for the previous financial year, together with the standing charges for that period. Then, if the former is, say, £500, the latter £300, and the total of the two is one third of the turnover, then a claim would be worked on the following basis. Suppose the turnover for the six months immediately following a fire amounted to £600, then the insurance company would pay the loss of profit, plus the standing charges, which together amount to £200—one third of the decrease in the turnover—as formulated above. To this figure all companies add the sum of the increased expenditure incurred in running the business under difficult circumstances. Any readers who have experienced the semi-strangulation of their business after a fire will endorse my advice that this is a policy which should be effected *at once*.

**Burglary Policies.**

There are those who foolishly think that bolts and bars are sufficient security against theft. But the modern crook is so ubiquitous and so scientific that bank vaults alone offer any real resistance to him. Five shillings per cent. is usually asked of the electrical trader on this policy, and the valuable nature of much of his stock makes it most desirable that he should cover it "up to the hilt." This rate may well vary—more or less—in different districts, but it is the special rate quoted for our trade when no extraordinary risks are run. In filling up proposal forms, it is usually required of the dealer to state whether the policy is to cover cash in safe as well as stock and fittings. Only movable articles need, of course, be included in the total insured. Pilfering by customers is *not* indemnified under this policy, but the cost of repairing damage done by burglars as well as the value of goods actually stolen can be recovered.

Insurance is not a matter to be thought about "when there's time." For its due consideration time must be *made*, and he is a wise man who lays out liberally in order that he may sleep at night secure in the knowledge that the blows of fate cannot affect him, materially at least.

# Income Tax.

## October 5th, 1927—An Important Date for Traders.

By M. L. HARGREAVES.

FOR income tax, 1927-28, under Schedule "D," taxpayers will have the choice of retaining the average under certain conditions, as provided for by Section 29 (3) of the Finance Act, 1926, which reads as follows:—

"If any person who for the year 1926-27 was assessed and charged under Schedule "D," or according to the rules applicable to that Schedule in respect of profits or gains or income arising from any source upon an average of a period of three years or more, proves that the profits or gains or income of either of the first two of the three years upon the average of which he would, but for the provisions of this section, have been charged for the year 1927-28 were less than the profits or gains or income for one year upon an average of the six years preceding those three years, or, if he was not in possession of the source of the profits or gains or income during the six years aforesaid, upon an average of the less period preceding the said three years during which he was so in possession, he shall, on giving notice in writing to the surveyor not later than October 5th, 1927, that he desires so to be charged, be charged to tax for both the years 1927-28 and 1928-29 in respect of the profits or gains or income arising from that source on the amount on which he would have been charged if this section had not passed:

"Provided that for the purpose of the foregoing provision a person shall be treated as having been in possession of the source of any profits or gains or income during any year, if during that year he was in possession of the source on his own account or the source was in the possession of a partnership of which he was a partner.

"This sub-section shall apply to persons in partnership as it applies to a person, and persons in partnership shall be deemed to have been in possession of the source of any profits or gains or income during any year if any of them was during that year in possession of the source on his own account, or the source was in the possession of a partnership of which he was a partner."

A few figures will illustrate the meaning of the above section.

Figures shown in "A" prove that the taxpayer cannot continue to pay on the average profits for 1927-28 and 1928-29, as neither of the profits of the two years coming into average for 1927-28 in the ordinary way (had this section not passed) are less than the average of the six preceding years.

The year of trading in the example is taken to end on October 31st.

The years ordinarily coming into average for 1927-28 would therefore be:—

Year ended October 31st, 1924.
Year ended October 31st, 1925.
Year ended October 31st, 1926.

The profits for the six years ended October 31st, 1923, must now be ascertained, that is, the profits as adjusted for purposes of income tax which are assumed to have been as follows:—

| | "A." | "B." |
|---|---|---|
| Year ended October 31st, 1918 ... | £560 | £100 |
| " " " " 1919 ... | 616 | 700 |
| " " " " 1920 ... | 420 | 400 |
| " " " " 1921 ... | 520 | 300 |
| " " " " 1922 ... | 330 | 300 |
| " " " " 1923 ... | 800 | 600 |
| | 3,246÷6 | 2,400÷6 |
| Average ... | £541 | £400 |

| | "A." | "B." |
|---|---|---|
| Year ended October 31st, 1924 ... | £600 | £450 |
| " " " " 1925 ... | 550 | 300 |

It will be observed that the profits of both 1924 and 1925 are greater than the average of the six preceding years.

The figures in "B" show the opposite position, and as the profits of one of the two years, *viz.*, those of 1925, are less than the average of those of the six preceding years, the taxpayer can revert to average if he so wishes, but if he elects to do so he must then

continue on average for one more year, *viz.*, the year ended April 5th, 1929.

It does not, however, follow that if the taxpayer is able to retain the average it will be of certain benefit to him, and will in many cases be somewhat of a gamble.

The following figures will illustrate this point:—

Taking the profits as shown by "B" as above, and the profit for the year ended October 31st, 1926, as £900, then the average for 1927-28 will be £550, *viz.*:

| | |
|---|---|
| Year ended October 31st, 1924 ... | £450 |
| ,, ,, ,, ,, 1925 ... | 300 |
| ,, ,, ,, ,, 1926 ... | 900 |
| | 1,650 ÷ 3 |
| | £550 |

By the end of September, 1927, the taxpayer will know approximately what his profits will be for the year ending October 31st, 1927, and presuming them to be only £10 (adjusted profits for purposes of income tax), then the average for 1928-29 will be £403, *viz.*:—

| | |
|---|---|
| Year ended October 31st, 1925 ... | £300 |
| ,, ,, ,, ,, 1926 ... | 900 |
| ,, ,, ,, ,, 1927 ... | 10 |
| | 1,210 ÷ 3 |
| | £403 |

It would, therefore, benefit the taxpayer *not to retain the average* in spite of the average for 1927-28, *viz.*, £550, being less than the profits of the preceding year, *viz.*, £900, for he would pay £8 12s. *less in tax* by paying on the preceding year's profits, thus:—

| | |
|---|---|
| ON AVERAGE. | |
| 1927-28, £550 at, say, 4s. in the £ ... | £110 0 0 |
| 1928-29, £403 at, say, 4s. in the £ ... | 80 12 0 |
| Tax payable ... | £190 12 0 |
| ON PRECEDING YEAR. | |
| 1927-28, £900 at, say, 4s. in the £ ... | £180 0 0 |
| 1928-29, £10 at, say, 4s. in the £ ... | 2 0 0 |
| Tax payable ... | £182 0 0 |

The taxpayer should, therefore, endeavour to see which method will give him in this connection the most relief.

It must be borne in mind that a very considerable amount of tax can be saved if the profits, as computed on average, are compared with those for the previous year, especially in cases where the profits are not normal.

The saving of tax, as shown in the example is, of course, no criterion as to the amount of tax which might be saved.

# A London Supply Co.'s New Premises.

## The Kensington and Knightsbridge Showrooms.

THE Kensington and Knightsbridge Electric Lighting Co., Ltd., moved into new headquarters a short time ago, and it now has all its departments in one building. This building is a long and flat one, and while not altogether beautiful, is admirably designed for its purposes. There are spacious and well-lighted offices, showrooms, show windows, and a staff kitchen.

The main show window, a view of which appears in fig. 1, is admirably constructed and arranged, and at present is devoted to a display of cooking and water-heating apparatus. The entrance hall is flanked by two quadrant-shaped windows in which various small domestic appliances are arranged.

The main showroom (fig.2) is a long apartment, comfortably furnished, containing a fairly large display of the appliances with which the company deals. It has recently commenced the hiring out of cookers (including hire-purchase) and has adopted "Jackson" apparatus for this purpose. A cooker-hiring scheme tried out a few years ago did not prove successful and was abandoned. In view of the progress made since then, both in the education of the public and in the construction of electric cookers, the company is confident of success. "After care" or service is sedulously pursued, for apart from the risk of displeasing consumers, an out-of-action cooker, or other appliance, is of no use to an electricity supply company. This important matter has not received adequate consideration in many quarters. The company is also willing to hire vacuum cleaners and fans if they are required. The cleaner on view in the showroom is a "Vac-Tric" machine, while a number of small but effective "Universal" fans (L. G. Hawkins & Co., Ltd.) are also displayed. Among the other appliances shown are numerous electric fires, but to effect a certain amount of standardisation the company has confined its attentions to five makes, *viz.*, "Sullivan," "Premier," "Creda," "Revo," "Berry," and "Belling." "Premier" irons and kettles and "Universal" table

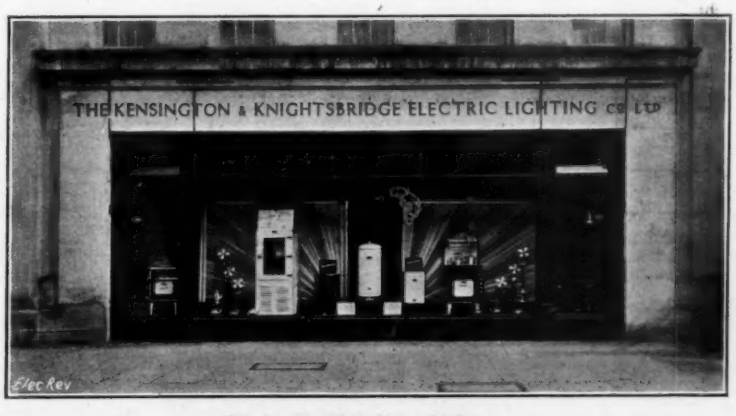


Fig. 1.—The Main Show Window.

appliances add brightness to the display. Consumers are asked to look on the place as a reception room, and they are never pressed to buy appliances. The company thinks, with a certain amount of justice, that too-aggressive salesmanship has a deterrent effect and frightens the customer from paying a second visit. Complaints are welcomed (if that is the word), for the company constantly seeks opportunities for perfecting its service.

The staff kitchen plays a dual part. It not only provides meals for 40 persons daily, but is also a part of the showrooms where visitors can see electrical equipment in actual service. The cooking is done by two 8-kW "Jackson" cookers, and close up against one of them is a "Frigidaire" refrigerator. These two strange neighbours work well, each unaffected by the other's proximity. The main hot-water supply is obtained from an 11-gal. "Sadia" heater, and for tea and coffee a 2-gal. quick-boiling "Jackson" urn is employed. Another "Jackson" appliance which is found very useful is a double-sided hot-cupboard. An exhaust fan fitted into the wall extracts the cooking odours from the kitchen. It should be mentioned that the lay-out of the kitchen closely resembles that of the typical mansion kitchen, of which there are so many in the company's district. Each appliance in the kitchen is connected to a separate "Ferranti" meter enabling its consumption to be checked. The wiring of the premises was carried out by Messrs. Troughton & Young, of Knightsbridge, under the direction of the chief engineer, Mr. G. C. Weston, M.I.E.E. Two systems have been employed, mainly to allow visitors to see the effect. Screwed conduit has been installed generally, but several of the apartments have been wired by means of the "Henley" system. This provides a demonstration of the neatness with which surface wiring work can be carried out.

For assistance in preparing this article we are indebted to Mr. G. S. Britton, A.C.I.S., manager and secretary of the company, and Mr. B. L. Wilson, showroom manager.

Fig. 2.—The Large Showroom.

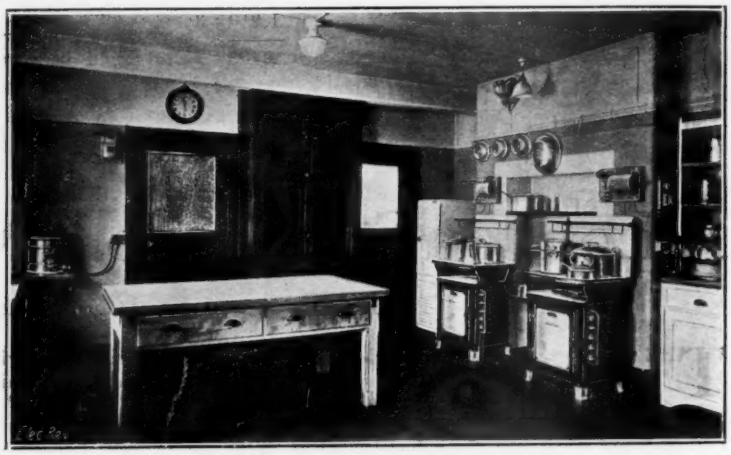

Fig. 3.—The Staff Kitchen.

# The E.H.P. Conference at Paris.

## A Review of the Proceedings.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

LAST week the fourth Conference on Large Electric Systems was opened at Paris under the Presidency of the French Minister of Public Works, M. André Tardieu, supported by M. Cahen, Vice-President of the French Union des Syndicats de l'Electricité (in the absence of M. Legouez, the President, who is in America at present). It is due to the initiative of this Union that the Conference has been brought into being and nursed through its early stages, until it has reached its present highly successful standing.

The scope of this Conference seems to be gradually widening. At first, it concerned itself principally with extra-high-pressure transmission of electric power; now, however, it covers a much wider field, though this is chiefly concerned with modern large-scale, electric power generation and distribution. While the 75 papers presented did not overlap, they were divided into three main groups. In addition, Mr. C. Le Maistre presented a paper on International Standardisation. The first group dealt with the equipment and operation of central stations and of transformer sub-stations; the second section covered the construction and insulation of transmission lines, and the third division was reserved for matters pertaining to the operation and arrangement of distribution networks.

Year by year, the organisation of this Conference has improved under the able guidance of the general secretary, M. Tribot Laspière, who, it may be remarked in parenthesis, since the holding of the last Conference, has been honoured by the President of the French Republic with the decoration of the Légion d'Honneur for the good work he has done in encouraging the development of the use of electricity.

Over twenty-five countries are represented at this Conference; they now include Germany, since that country has been admitted to the League of Nations. The proceedings were conducted mainly in French, the alternative language being English. When the French

language was used, the gist of the speaker's remarks was very capably rendered into English by Mr. R. A. McMahon; the Conference is to be congratulated upon having secured his services, as so few translators of technical speeches seem to be able to grasp the fine engineering points, for which a mere literal translation is of little avail.

At the opening of the Conference, Great Britain was not as well represented as on previous occasions. For one thing, the activities of the Central Electricity Board prevented the attendance of Mr. W. B. Woodhouse (the first delegate) and several other members who usually attend. This is the first of these Conferences that Mr. Woodhouse has missed. In his absence, Mr. C. Rodgers was appointed as chairman of the British members, but at the last moment he also could not go, so Mr. R. Borlase Matthews became first delegate. The other British delegates were Mr. T. R. Beard, Mr. F. H. Clough, and Mr. P. V. Hunter. Mr. C. Le Maistre and Dr. G. Semenza were the official delegates of the International Electrotechnical Commission. The following English members notified their intention of attending the Conference, but at the time of writing, not all of them had arrived; in addition, a few others were also expected:—Messrs. R. C. Andersen, G. Dean, P. Dunsheath, — Fitzgerald, W. E. Freir, B. L. Goodlet, — Grant, R. W. Gregory, R. O. Kapp, — MacEachron, R. A. McMahon, J. M. Scott Maxwell, — Michie, A. Monkhouse, G. H. Nash, G. R. F. Nuttall, E. T. Painton, — Petch, Major T. Rich, Messrs. T. N. Riley, C. A. Stephens and C. Vernier.

Any conference that brings together a number of engineers from various countries provides a record of many useful and interesting experiences—both official, through papers and formal discussions; and unofficial, due to the informal meetings. Ample accommodation was provided in the Conference Halls for the latter, which greatly facilitated conversations.

In these present comments on the Conference, it is proposed briefly to review the vast amount of material rendered available, so that a general survey of progress may be obtained. In this way an indication will be given as to what may be looked for in the official proceedings, when they are published in due course, by those unable to attend the meetings.

Commencing with the opening speech of the Minister of Public Works, it was interesting to note the reflection of French views on general electrification that it contained. It favoured the elimination of small generating stations, and the substitution therefor of superpower plant and transmission at 220,000 volts. He stated that only two days previously he had assisted at the opening of a new electrified section of the Midi Railway system, which had reduced an eight-hour journey to six hours, and also made possible an increase in the number of trains. He complained that the State Railways did not appreciate as much as the privately owned railways the importance of combining the generation of electricity for both railway and general local purposes. In fact, the Midi was converted from a single-phase to a three-phase system on this score. He mentioned some of the great French electrical development schemes for the supply of power from the Rhine, the Central Plains and the Rhône, which called for 2,500 kilometres (1,560 miles) of new transmission lines. An important feature that he emphasised was that while the number of consumers might be limited, that was not the case with the possible applications of electricity. Hence it was very important to give attention to this matter, for, after all, the all-important thing was the consumption per head.

At the opening meeting Mr. W. B. Woodhouse was re-elected as one of the Vice-Presidents of the Conference, and M. Legouez was made President, with Messrs. Blondel, Mailloux, and Semenza as Presidents d'honneur.

The *Proceedings* of this Conference will be printed in French. In previous years there has been insufficient demand for copies in English; however, this year, if as low a number as 300 is subscribed for, an English edition will be issued. The cost will be 150 francs (say, 25s.). Application should be made to the Secretary of the Conference at 25, Boulevard Malesherbes, Paris.

In the course of the first two days' discussions, two matters arose which encroached upon the sphere of the International Electrotechnical Commission. These were the questions of the most suitable test pressures and new points on the testing of oils and insulating materials. This was an excellent illustration of the difficulty of definitely delineating the scope of each International Conference. Every effort is made at the Paris Conference to avoid any overlapping, hence the first matter (which was dealt with in a joint paper by Messrs. Bakker and Van Staveren) was definitely referred for the consideration of the I.E.C., while the second (covered by papers from the Polish delegation, Pellissier, Biterli, Bruckmann, Weiss and Solomon, Michie and Le Maistre) is also, by inference, to be passed on to the same body.

It seems probable that the question of the definite field of every International Conference will be discussed at the I.E.C. Conference at Como in the coming autumn. A number of engineers are of the opinion that even the I.E.C. programme should be extended, so that the basic principles that eventually affect standardisation might be thoroughly ventilated before the body that has to finally deal with them. By the way, Britain seems to be regarded by many Continental engineers as a brake on progress in standardisation matters. Probably this is not entirely true.

Turning to the subject in which the writer is more especially interested, there were many illustrations of increasing attention to the applications of electricity to agriculture. In all countries it is evidently considered to be one of their important problems. In view of this, time has been squeezed in to show a French electro-farming film. This is an extra to the original programme.

On Saturday evening last the foreign members of the Conference were entertained at dinner by the Union des Syndicats de l'Electricité. A difficulty of International affairs of this kind is the interminable number of speeches that are given, so that no individual country's feelings may be hurt. To overcome this, the first delegates of each nation had a meeting prior to the dinner, at which it was agreed to reduce the speeches to four, so M. Borgquist spoke in French on behalf of Scandinavia; Professor Drewnowski (Poland) for Central Europe; M. Uytborck (Belgium) for the Latin-speaking races; and Mr. R. Borlase Matthews (Great Britain) on behalf of all English-speaking countries. In the absence of Dr. Semenza, the President of the I.E.C., Dr. C. O. Mailloux responded on behalf of that Association. During the course of his speech he mentioned the interesting fact that the I.E.C. attained its twenty-first birthday on the morrow (June 26th).

At the end of the Conference the foreign members are inviting their hosts, the Union des Syndicats de l'Electricité, to dine with them.

On Monday last the members were entertained at an artistic and musical soirée devoted to ancient and modern French dances, by the Association of Constructors of Electrical Transmission Systems and Power Plants. On Wednesday last the President of the French Republic did the Conference the honour of receiving the principal delegate of each country at the Palais de l'Elysée, with its beautiful grounds and fountains in the heart of the city.

On the same afternoon the Bienvenue Française gave a garden party and dance at the old home of the Rothschilds (now known as the Rothschild Foundation).

Thus the social side was well looked after, and these items were supplemented by various small entertainments of one country by another; also by visits to central stations, electrified railways and factories. All this sort of thing does much to bring people of different nationalities together and thus smooth out many misunderstandings, and also prevent their arising in future, while at the same time technical knowledge is spread to mutual advantage.

*(To be continued.)*

# The National Physical Laboratory.

## Annual Inspection by the General Board.

THE annual inspection of the N.P.L. by the General Board took place on June 24th, when a large number of visitors was received by Sir Ernest Rutherford, O.M., president of the Royal Society and chairman of the Board, Sir Richard Glazebrook, K.C.B., F.R.S., chairman of the Executive Committee, and Sir Joseph E. Petavel, K.B.E., D.Sc., F.R.S., director of the N.P.L. Tea was served in the main aerodynamics building, and the gardens of Bushy House were open to visitors during the afternoon, whilst apparatus and experiments in progress in the various departments were demonstrated and explained.

In the Physics Department it was noticed that sound-pulse photography is carried out by means of the passage of an electric spark across a short gap so that a single spherical sound-pulse is produced; by means of a second illuminating spark-gap activated after a suitable time interval, the shadow of the pulse can be photographed. This method can be used for testing the acoustic properties of buildings by the use of sectional models.

Gas analysis apparatus based on the measurement of wave-length of high-frequency stationary waves employs a quartz crystal, maintained in vibration piezo-electrically, to set up a stationary wave system in the gas mixture. The positions of the nodes are identified by the reaction on the crystal in the manner described by Pierce; by moving the reflector from node to node, the wave-length is determined, and this affords a measure of the composition of the gas mixture.

In a new high-frequency furnace exhibited oscillations are produced in a coil by a suitable valve system, the metal to be heated being placed within this coil and heated by the eddy currents induced in it by the oscillating current in the coil. Two high-power silica valves are employed, and these produce a current of about 150 amperes in the oscillatory circuit at a frequency of about 1 million cycles per second. One purpose of this furnace is the accurate determination of the melting point of palladium in connection with work being carried out on an international scale of temperature. It will prove of great value, not only in relieving the pressure on the existing high-frequency furnace, which is now severe, but also in facilitating new experimental investigations for which the very high frequencies obtainable in plant of this kind would be of special importance. Later, it may prove desirable to investigate the possibilities of induction furnaces working at much lower frequencies. This furnace equipment, which is on a larger scale than has hitherto been used, is now approaching completion, and improvements have been made in the arrangement and working of the existing furnace in the foundry. These include an improved water supply both to the water-cooled portions of the spark generator and to the inductor coils themselves, and the installation of a large rotary vacuum-pump, a portable rotary vacuum-pump, and a number of Kaye-Backhurst mercury-vapour pumps. Thanks to these arrangements, a much higher degree of vacuum is now obtainable in the various furnaces, although in view of the large amount of gas given off by molten metal and highly heated refractories, it is still impossible to maintain extremely high vacua. The attainment of a vacuum as low as 0.01 mm. of mercury over molten chromium at a temperature between 1,600 and 1,700 deg. C. represents, however, a considerable advance over previous practice.

Improvements and modifications have also been made to other types of furnace. It has been found necessary to install an electric furnace in the rolling mill for the pre-heating at high temperatures of rods and billets intended for hot rolling. The furnace in question is heated by means of a number of resistor rods made of a proprietary substance named "Silit," composed of a mixture of carborundum, carbon and silicon, pressed into rods by a special process. The present furnace is heated by forty resistors, each of which has a resistance of approximately 10 ohms. It dissipates 1 kilowatt in maintaining a temperature of 1,200 degs. C. The power required for the furnace as a whole varies from 12 to 18 kilowatts, voltage control being obtained over a considerable range by varying the arrangement of the bars either in series or parallel. A smaller furnace, two inches in internal diameter, has also been constructed for annealing specimens for microscopic examination. In this furnace the resistors are arranged around the periphery of an alundum tube, the length of the resistors being parallel to the axis of the tube. These furnaces, which are giving satisfactory results, supply a need for an easy method of maintaining temperatures higher than can be satisfactorily secured in ordinary gas-fired muffle furnaces which has been felt for some time in connection with a number of researches.

Another exhibit was various forms of X-ray spectrograph used in investigations of crystal structure, together with the auxiliary apparatus for measurements of the X-ray spectra. These methods of elucidating crystalline structure now find extensive use in industrial as well as purely scientific research and among various applications for which the apparatus is being employed may be mentioned the structure of special types of steel and crystallographic data of single crystals of metal which are being subjected to mechanical tests in the Engineering Department of the Laboratory.

Of late years it has become increasingly important to be able to test accurately and easily the spectral transmitting properties of materials in the ultra-violet region of the spectrum. Recognition of the beneficial therapeutic effects of ultra-violet radiation has created a demand for special glass which is transparent to the useful rays present in sunlight; on the other hand, the deleterious effect of these rays in injuring eyesight, causing pigments to fade, and metals to corrode, has encouraged the production of special glass to exclude harmful rays without obstructing visible light, for use in spectacles, picture galleries, aerodromes, &c. Apparatus suitable for testing the effectiveness of these glasses has recently been constructed and is now in use in the Optics Division of the Laboratory, while research on the improvement of method is still in progress.

In the Electricity Department (Wireless Division) apparatus was shown for the transmission and reception of waves as short as 2 metres, and an audio-frequency amplifier giving a known variable amplification demonstrated the remarkable insensitivity of the ear to changes of sound intensity; that is why there is such a big difference in the amplification required for "head-phone" and "loud-speaker" reproduction. The Laboratory has been studying the behaviour of aerials in transmission and reception: the difficulty of this work is that the only way to measure the current at different points in an aerial without changing the behaviour of the aerial is to put the measuring instruments actually *inside* the aerial wire. In the field outside the wireless hut is a special experimental tubular aerial built to enable this to be done, and the instruments are read with a telescope from the foot of the aerial. In North Lodge there was also on view a kind of magnified low-frequency amplifier built on a very large scale, with high-power valves instead of the usual small four-pin valves, to make possible the detailed study of various amplification processes. One of the rooms in this building has been completely enclosed in a cage of wire netting, to prevent the electrical generator contained in the room from disturbing the sensitive measuring instruments used in the rest of the building.

# The "W.O.B." Campaign.

## The Effort Reviewed.

THE Councils of the British Electrical Development Association and the Electric Lamp Manufacturers' Association of Great Britain have issued a report upon the Better Home Lighting Campaign of the autumn and winter of 1926-1927. This report is an independent one prepared by request of the E.D.A. Council by Lt.-Col. W. A. Vignoles, D.S.O., and Mr. R. W. Kennedy, Editor of the Electrical Contractors' Association, Inc. In the booklet containing this statement, there is a prefatory communication from Sir James Devonshire, president of E.D.A., and Mr. P. J. Brewer, chairman of E.L.M.A., expressing appreciation and thanks to the many thousands of electrical men and women who devoted personal service to the cause of the campaign. An immense amount of local support—Main Area Committees, members of Circles, firms, undertakings and individuals—contributed very largely to the success achieved.

Lieut.-Col. Vignoles and Mr. Kennedy, in their desire to be brief, confined their remarks to one or two of the outstanding achievements of the campaign. They give tabular statements concerning the number of advertisements inserted in the Press, the number of competition books distributed, and so on, while certain maps and diagrams are also incorporated.

The purpose of the campaign was to educate the public on mass lines, and to this end 1,520,000 competition books were circulated. No fewer than 162,503 (over 10 per cent.) were returned in the form of entries to the ballot competition—a

highly satisfactory result. It is difficult to say to what extent the electrical message got home, but no one can have seen the booklet without receiving many valuable electrical impressions which are bound to be translated into business. A deliberate and long-sustained effort was made to persuade the public to enter electrical shops and showrooms and to ask for the Competition Book.

"It is exceedingly difficult to persuade the average Briton to enter business premises except in search of clearly defined personal requirements; but the W.O.B. attempt was well worth making in order to bring local electrical displays, local electrical traders and the local supply authorities into immediate touch with the general newspaper-reading public."

"It cannot be expected that all the good results of the W.O.B. Campaign will be immediately obtained, and it must be remembered that the effort was made during a period of great industrial difficulty in this country. If, therefore, the Campaign increased the rate at which connections to the electricity supply mains would have been made in normal circumstances (which it certainly did), and if the Campaign helped the trade generally to maintain its normal development during a period of exceptional stress (which, once again, it most certainly did), then we may claim the whole effort to represent a very exceptional and remarkable success. Quite apart from the material achievements of the Campaign in the matter of securing new consumers, additional installation work and increased retail sales, it is never to be lost sight of that the W.O.B. Campaign exercised a most powerful moral effect upon the whole electrical industry. In certain areas those in charge of the local supply authority and local electrical contractors and traders, had never previously met together for the purpose of appreciating personal difficulties or for adjusting apparently conflicting outlooks. In very few cases indeed was any machinery in existence whereby the members of the local trade—supply, manufacturing, wholesale and contractor—could meet together in order to promote the common electrical good. The 'Electric Circles' set up under the W.O.B. Campaign provided such *official* points of contact and mutual understanding in 123 localities dotted all over the country, and there were many other unofficial assemblies of a like nature. The value of the electrical harmony and 'will to work together' established by these widely distributed points of trade contact cannot be over-estimated. To achieve the spirit of co-operative amity at present existing in the electrical industry was worth more than the whole cost of the Campaign.

"E.D.A. was assisted by seven area Committees who in turn organised the local 'Circles.' To these organisations a great deal of the credit for the success of the Campaign must be given. Without them, and the funds they collected, and more especially the work and enthusiasm they brought into the Campaign, much less would have been achieved. We are, in fact, of opinion that the local Demonstration Houses, Exhibitions and personal letters issued in connection therewith constituted one of the most valuable features of the Campaign. Further, the co-operation of all sections of the industry in the local efforts was of the greatest value to a proper understanding of the problem of propaganda for the electrical industry. It is to be noted, for example, that in areas where the Committees or Electric Circles were active, satisfaction is expressed with the results of the Campaign, whereas in areas where E.D.A. was expected to do the work single handed, satisfaction is not so general. We consider that this must necessarily be so. In promoting electrical development in general, local effort will have much greater influence on the mind of local residents than any national appeal. Thus it was found in certain towns that newspaper advertising entirely failed to bring the people to the showrooms to ask for the booklet, whereas circular letters and local personal effort produced immediate and satisfactory results. To sum up, we are confident that the W.O.B. Campaign more than achieved its purpose, and that the effort will have a very definite effect on the rate of progress of the electrical industry. We think that in any future Campaign every encouragement and help should be given to local efforts, which should be greatly intensified."

The report concludes with the thanks of the Supply, Contracting, and Retail industries to the officials and staffs of the E.D.A. and E.L.M.A. for the thorough and thoughtful organisation of "this impressive co-operative effort."

The total number of electric houses was 83 and electrical exhibitions numbered 35. The number of visitors to these demonstrations was 1,250,000, and very satisfactory results were reported by the majority of the Circles. There were 123 Circles and Centres of Activity and before and during the Campaign 222 trade meetings were addressed by members of the E.D.A. and E.L.M.A. staff.

From the map showing the operations in various areas we extract the following particulars (the figures indicate results on E.D.A. records, but may not represent fully actual W.O.B. activity):—

**Activity in the Districts.**

| | Electric Circles. | Electric Houses. | Exhibitions. | Visitors. | Book Distributors. | | Books. |
|---|---|---|---|---|---|---|---|
| | | | | | S. | C. | |
| N.E. Coast ... ... ... | 19 | 16 | 3 | 217,960 | 16 | 79 | 140,000 |
| North Midland .. ... ... | 18 | 18 | 7 | 220,000 | 28 | 217 | 188,000 |
| South Midland ... ... ... | 23 | 20 | 6 | 117,850 | 48 | 296 | 182,000 |
| North-Western ... ... ... | 5 | 4 | — | 207,000 | 45 | 256 | 218,000 |
| South-Western ... ... ... | 15 | 5 | 3 | 62,700 | 60 | 240 | 128,000 |
| London & Home Counties ... | 33 | 11 | 9 | 150,000 | 133 | 555 | 644,000 |
| Scotland... ... ... ... | 9 | 8 | 7 | 151,553 | 20 | 285 | 111,000 |
| Ireland ... ... ... ... | 1 | 1 | — | 10,000 | 5 | 6 | 4,500 |
| | 123 | 83 | 35 | 1,137,063 | 356 | 1,944 | 1,612,500 |

# Parliamentary News.

**[By Our Special Parliamentary Reporter.]**

### Tenders for Electric Cables.

On June 21st, Sir R. THOMAS asked the President of the Board of Trade whether he was aware that tenders for electric cables for this country had repeatedly been secured by foreign firms owing to the operations of price-fixing associations, which maintained the British quotations at an artificially high level; and whether he would consider appointing a committee to inquire into the matter.

Sir P. CUNLIFFE-LISTER said he was aware that some orders for electric cables had been placed abroad, but there were a number of well-known causes for the higher prices of many manufactured articles in this country, and he had no evidence that the disparity in this case was to be ascribed to the particular cause suggested. He was not prepared to appoint a committee of inquiry.

### Telephone Wires.

On June 21st, Mr. HORE-BELISHA asked the Postmaster-General whether it was the intention of his department to issue instructions that, wherever possible, telephone wires should not be run across, either above or below, wireless receiving aerials.

Sir W. MITCHELL-THOMSON said there was already a standing instruction which provided for the alteration of telephone wires on private property which interfered with wireless reception, and he did not consider that further instructions were necessary. If the hon. member would furnish him with particulars of any cases in which reception was hampered, he would see whether steps could be taken to remedy matters without incurring undue expense.

### Automatic Telephones.

On June 22nd Sir W. MITCHELL-THOMSON informed Mr. Harris that a large number of automatic telephone exchanges were already working in the provinces. It was hoped to open the first automatic telephone exchange in London during the coming autumn, two others by the end of the year, seven more during 1928, and a large number during succeeding years. The cost of providing telephone service depended largely on the calling rate and the character of the traffic. It was not possible, therefore, to give a representative general figure. Automatic plant involved considerably greater capital outlay than manual equipment. The first automatic exchange to be opened this year would be Holborn, then Bishopsgate, and then Sloane. The first three next year would be Western, Monument and Bermondsey.

### Trunk Circuits.

On June 22nd Sir W. MITCHELL-THOMSON informed Colonel Applin that 951 additional trunk telephone circuits were brought into use during 1926, and 390 miles of trunk cable, comprising 67,753 miles of single wire, was purchased and laid.

### The Central Board.

On June 21st Mr. KELLY asked the Minister of Transport what parties and interests were consulted as to the appointment of the chairman and members of the Board set up under the Electricity (Supply) Act, 1926.

Colonel ASHLEY said that before appointing the Central Electricity Board he consulted a large number of associations and individuals representative of the interests of local government, electricity, commerce and industry, transport, agriculture and labour. He could not undertake to give a detailed list of those who were consulted in connection with the matter.

# Reviews.

**Controllers for Electric Motors.** By H. D. JAMES, B.S., M.E. 2nd Edition. Pp. vi+522; figs. 444. London: Chapman and Hall, Ltd. Price, 21s. net.

The size of this book has been considerably increased in the second edition, chiefly by the amplification of the text, and by the addition of 185 illustrations. Several new chapters have, however, been introduced on subjects which were either included under other headings or omitted from the first edition of 1920, owing to their small importance at that date.

Some of the definitions given in the introduction to the book are rather loose. Thus on page 5 it is stated, referring to Friction Braking, that a mechanical brake is usually "released by a magnet in series with the main circuit of the motor," and no reference to shunt brakes appears under this heading. Similarly, in referring to Dynamic Braking, it is stated that full field strength is used, whereas it is well known that a field weakening resistance is usually employed.

Chapter II, which deals with the historical development of various types of control gear, might with advantage have been omitted, as well as Chapter III, containing the requirements of the National Electric Code and the National Electric Safety Code, with reference to switchgear.

The acceleration of motors by the time element and current limit methods is discussed in Chapter IX, in which some useful conclusions are arrived at with regard to the spheres of use of the different methods.

Chapter X, dealing with the starting characteristics obtained with different methods of control, contains numerous starting and braking test curves which are very useful and instructive. A conclusion is arrived at in this chapter that one accelerating contactor is sufficient for d.c. motors up to 15 h.p. This procedure would not be favoured in this country.

Chapter XIV is devoted to a description of various types of adjustable speed set for a.c. motors, and is fairly comprehensive on the descriptive side of this subject. The types of set described in this chapter are:—(1) Secondary a.c., through rotary convertor driving d.c. motor coupled to main shaft. (2) Secondary a.c. returned to line through rotary convertor and d.c. motor-induction generator set. (3) Secondary a.c. returned to line through polyphase commutator motor-induction generator set. (4) Secondary a.c. drives polyphase commutator machine coupled to main shaft. (5) Secondary a.c. through frequency changer drives synchronous machine coupled to main shaft. (6) Secondary a.c. returned to line through self-driving frequency changer.

In Chapter XV, on alternating current controllers, attention is given to the effects of unbalanced starting resistors on the operation of induction motors, and considerable space is devoted to the subject of auto-transformer starters and the distribution of currents in auto-transformer coils. In Table III on page 188 the torque for a 100-h.p. induction motor with unbalanced starting is given as 34 lb. ft.; this apparently should read 340 lb. ft. The omission of any reference to the star delta method of starting in this section is very peculiar.

Chapter XVI, on synchronous motor control, is one of the most useful in the book, giving very complete explanations of the field frequency and time element methods of starting which have been successfully employed in numerous applications in America.

The last fourteen chapters of the book, which cover 190 pages, are devoted to a description of the various practical applications of electric control. The subjects covered in this section are:—Machine tools, calendering and printing machines, paper machines, steel mill auxiliaries, cranes, car dumpers, ore and coal bridges, coke handling equipment, elevators, oil wells, industrial and mine locomotives, and heavy traction locomotives. Some of these subjects, *e.g.*, car dumpers and ore and coal bridges, are of considerable interest in view of the comparatively few applications which exist in this country, and the illustrations contained in these two chapters in particular are very interesting.

The whole of the book is amply illustrated, and while this leads in some cases to difficulty in reading text and illustrations together, the work is, on the whole, compiled in a very satisfactory manner.

The proportion of errors is, for a book of this type, very low, and the work can certainly be recommended to those desiring a clear insight into the practical side of electric control gear and its applications.—G. WINDRED.

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**Electric Lighting, Starting, and Ignition for Motor Cars.** By HAROLD H. U. CROSS. Fourth Edition. Pp. xliii+328; figs. 185. London: Crosby Lockwood & Son. Price 15s. net.

The author is well qualified to produce a book of this kind dealing with the ignition, electric lighting, and engine starting of petrol cars, for not only has he been associated with electrical matters for many years but, to the writer's knowledge, his experience extends to every Continent of the world with perhaps the single exception of Asia.

It is not proposed to criticise the work too closely from the technical point of view, although in a few cases this might perhaps have been done, for the reason that Mr. Cross makes it clear his purpose has been, not that of writing for the technical man, but rather for the average motorist, whose knowledge of electrical principles and details is usually not very great.

The book begins with a forty-page prologue in which the author discusses his subject in a general manner, dealing with batteries, dynamos and starters, and ignition principles. While the text is quite readable and instructive, there is one statement on page xvii that those interested in the manufacture of electrical equipment for motor vehicles are likely to resent and one that may give a wrong idea to motorists. We refer to the remark that "of car failures, 78 per cent. are of an electrical nature." We do not know the source of the author's figure, but, judging from the only reliable information available in this country, it is far too high. We refer to the annual return lately issued by the Royal Automobile Club of the causes of car failure under its "get-you-home" scheme. This shows that 7,575 cases of roadside breakdown were dealt with in 1926, of which 22.5 per cent. were due to ignition, 0.6 to starting troubles, and 2.1 per cent. to lighting, the total failures from an electrical cause being thus only 25.2 per cent., or less than a third of Mr. Cross's figures.

In his first chapter the author gives in simple language an explanation of the chief of the technical terms used in connection with electricity. In this section there is a somewhat lengthy reference to acetylene lighting which might well be deleted from future editions. Car lighting is dealt with in Chapter II, the ground being well covered; indeed, it may be said to be too well covered seeing that to-day all cars, even the latest £100 vehicles, are fitted with an electric lighting set, rendering any instructions as to how motorists can add such installations to their vehicles unnecessary. We notice, too, that the author still refers to electric bulbs in terms of c.p., whereas watt sizes are now universally used and standardised in connection with car lighting as well as in house and shop installations.

Chapter III deals in a lucid manner with the "Requirements of Car Starting," while in succeeding chapters Mr. Cross discusses at length the subject of dynamo cut-outs, starting motors, batteries, switchboards, cables, and starters. One of the most useful chapters in the book is that to which the title "The Fault-Chaser's Friend" is given, in which much of the information provided on preceding pages is conveniently summarised and further elucidated by diagrams of the wiring circuits of the lighting and starting installations of the chief systems on the market. The author rightly emphasises the need for particular care of the battery, which unit, he points out, is "the most ill-used of any, complains the least, and always dies game right on the job."

The chapter is accompanied by a table of the principal car-lighting dynamos and engine starters in use, with references to the pages on which they are dealt with. There is also a "Repair Man's Guide to Windings," and, facing the title page, a "Trouble Guide," which summarises the chief causes of failures of magnetos, dynamos, and starters.

The book is well printed in readable type, with many clearly-drawn diagrams. If a further edition becomes necessary we would suggest that the words "Bendix," "Bowden," and "Whittle," which are still trade names and not common nouns, should be given initial capital letters in place of the small letters in the book. On page xxiv, too, the word "car" is used instead of "engine."

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**Wireless Pictures and Television.** By T. THORNE BAKER, F.C.S., F.R.P.S. Pp. x+188; figs. 99. London: Constable and Co., Ltd. 1926. Price 6s. 6d. net.

The art of picture telegraphy is so mysterious, and withal, so fascinating, not only to the lay person, but also to the average engineer, that a brief account of this subject by so well known an authority as Mr. Thorne Baker will doubtless be welcome to a large circle of readers. The practical application of this art is making rapid progress, and the author of this book considers that, in spite of the tremendous technical difficulties involved, television is "sure to come."

After an introductory chapter dealing with early methods devised for the transmission of pictures, the author deals in some detail with the theory and application of the selenium cell, the photo-electric cell, and the various other component parts used in picture transmission. Various systems of transmission by wire are then described at considerable length. A chapter is devoted to the subject of wireless photo-telegraphy, and a good account of the author's system is given. The final chapter deals with the interesting subject of television. The author here sets out the magnitude of the problem involved, describes the work which has been carried out in this direction, and discusses the probability of a complete solution being achieved.

Those who read this excellent little work will be impressed with the difference in the magnitude of the problem involved in the perfection of wireless television, as compared with wireless telephony, and the patience and ingenuity of the various investigators who have carried the art of picture transmission to the stage it now occupies are worthy of the highest praise and most generous appreciation. We can cordially recommend Mr. Thorne Baker's work. It is considerably more than a popular description, and gives a real scientific treatment of the subject, which will enable the serious reader to obtain a good grasp of the theory underlying the various stages in the complex process of picture transmission.

# Business and Industrial Notes.

**The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.**

### The "Electrical Review" Index.

Th Index to Vol. C (for the half-year ended June 30th, 1927) will be published shortly, and we shall be glad to receive the names and addresses of those who require it (free of charge) for binding purposes, or wish to retain it for reference. Application should be made to the Publisher, 4, Ludgate Hill, E.C.

### The Crypto Football Team.

The group in the accompanying illustration is the football team of the Crypto Electrical Co., Ltd., photographed at the end of a successful season. The team won the Willesden

**The Crypto Football Team.**

Hospital Charity Cup and the Harrow and District League Cup (Division 1). They also reached the semi-final in the competition for the Wembley Hospital Charity Cup.

### I.M.E.A. Convention Enterprise.

BERRY'S ELECTRIC, LTD., has sent us a photograph (reproduced herewith) of its showrooms in Buxton which were visited during the I.M.E.A. Convention week by a large number of members and visitors, principal hotel proprietors, residents, and shopkeepers. For the convenience of visitors the small fleet of cars shown in the picture were used as passenger conveyances backwards and forwards between the respective hotels and showrooms. A new sign on the front of each vehicle deceived many who thought that they were illuminated by electricity; the effect is actually obtained from the sky and is even brighter than a neon sign. The sign can be electrically illuminated so as to make it effective for the whole 24 hours. 2A, Station Approach, or the "Touchbutton Club," as it was christened by the director of E.D.A., was well patronised from 10 a.m. until after midnight each day.

**Berry's at Buxton.**

### Greek Tariff Reductions.

Under the convention between Greece and Italy which came into force on June 6th, the duties on a number of classes of goods imported into Greece have been reduced. One of the items is "dynamos and electric motors in general," the duty on which is reduced to 15 gold dr. per 100 kg. The new rates apply to goods of United Kingdom origin.

### Czecho-Slovakian Electrical Imports.

The *Board of Trade Journal* states that the imports of electrical machinery, tools, &c., during April last were valued at 22,355,000 crowns (about £136,000). During the first four months of the year the total value of imports of this class was 76,304,000 cr. (about £465,000).

### New Municipal Showrooms and Offices.

The Electricity Committee of the Shoreditch Borough Council has recommended that the borough electrical engineer, in conjunction with the borough surveyor, be authorised to obtain designs and plans for the erection of electricity showrooms, stores and offices. It is proposed to invite selected architects to submit competitive designs, and to offer a premium of 50 guineas for the most suitable.

### Wages in the Electricity Supply Industry.

A reduction in wages in the electricity supply industry, as from July 1st, is announced by the West-Midlands District Council for the industry. There will be a reduction of one penny per hour in the rates of wages of adult employés and a reduction in the pay of youths and apprentices employed by constituent undertakings, as follows:—1s. 6d. per week in the case of boys of 16 and 17 years of age; and 2s. 8d. in the case of youths of from 18 to 20 years of age, inclusive.

### The Proof of the Pudding——

The advantages offered by electric cooking are so marked in respect of restaurants and eating houses that electric grills, ovens, and similar equipment, are supplanting other types in all parts of the country, and those who use them are enthusiastic in their praise. We learn that at Golders Green, Miss B. Simmons, the proprietor of the Vegetarian Café and Health Food Stores, known as the "Pure Food House," has installed two "Magnet" cookers manufactured by the General Electric Co., Ltd., and is so pleased that she is voluntarily acting as a propagandist for electrical cooking equipment; she expresses her willingness to allow any of the residents in the district who may contemplate the installation of electric cookers to inspect her equipment and examine the products cooked by it.

### Proposed Hungarian Tariff Reductions.

The *Board of Trade Journal* for June 23rd reproduced tables showing the proposed alteration of duties upon certain classes of goods imported into Hungary, together with the existing duties. From these it is observed that reductions are proposed in the case of "electrical apparatus for engines," electric carbons and sparking plugs.

### Merchandise Marks.

The Standing Committee (General Merchandise) appointed by the Board of Trade, will hold an inquiry as to whether the under-mentioned and some other classes and descriptions of imported goods should bear an indication of origin, as follows:—

Electric lampholders, wall plugs, switches, and similar household fittings and metal parts thereof; on 4th and 5th July, at 11.30 a.m. and 10.30 a.m., respectively.

Place of inquiry, Room 76, New Public Offices, Great George Street, London, S.W.1. Communications as early as possible to the secretary, Mr. E. W. Reardon, at that address.

The Board of Trade has referred to the above Committee applications for Orders in Council to be made requiring indications of origin in the case of the following imported goods:—

Iron and steel wire in coil, including strand wire; wire nails and wire staples; also products of the above.

Representatives of interests substantially affected should communicate with Mr. Reardon by July 15th.

### Book Notices.

"*Journal* of the American Institute of Electrical Engineers." Vol. XLVI. June, 1927. New York: The Institute. Price $1.

"Science Abstracts" (A and B). Vol. XXX. Part 6. June 25th. London: E. & F. N. Spon, Ltd. Price 3s. each.

"Regulations for the Electrical Equipment of Buildings" (formerly I.E.E. Wiring Rules). Ninth edition. Pp. 128. London: E. & F. N. Spon, Ltd. Price 1s. 6d. net (cloth), 1s. net (paper).

"Protection of A.C. Systems against Short Circuits." By Major E. Ivor David, M.I.E.E.—Reprint of a paper delivered before the Association of Mining Electrical Engineers, South Wales Branch. Pp. 31; 19 figs. Cardiff: The Association. Price 3s.

### Recent Contract.

Messrs. JOHN THOMPSON WATER TUBE BOILERS, LTD., have received a contract from the Tata Iron and Steel Co., Ltd., Jamshedpur, India, for ten vertical straight-tube "Alpha"-type water-tube boilers, each having 10,660 sq. ft. of heating surface, complete with steam and water fittings, suitable for a working pressure of 225 lb. per sq. inch, together with superheaters, air heaters, steam receivers, and forced-draught equipment. These boilers are to be fired by blast furnace gas.

### Trade Announcements.

Mr. E. J. WILCOCK has relinquished the position of works manager to the Robinson & Hands Electrical Co., Ltd., Birmingham, which he has held for the past eight years, the company having decided to close the electrical machinery repair section of its business. He has commenced business under his own name as an electrical and mechanical engineer at 30 & 32, Cowper Street, Summer Lane, Birmingham, where his premises are equipped for the overhauling, rewinding, &c., of electrical plant.

THE WESTMINSTER TOOL AND ELECTRIC CO., LTD., of Westool Works, Putney Bridge Road, S.W.15, has ceased to represent the Flexible Shaft Manufacturing Co., of Stratford, E., for the sale of its flexible shafts and accessories.

The business of Messrs. E. PINCOTT & Co., electrical and radio engineers, of 98, Station Road, Taunton, has been taken over by their late manager, Mr. P. Taylor.

WOODFYT SALES, LTD., have removed their factory to new premises at Little Camden Street, Camden Town, N.W.1. ('Phone: "North 5072.") The showrooms and registered office are continued at 8, Diana Place, Euston Road, N.W.1.

Messrs. WIGGLESWORTH & CROSSLEY, electricians, of 318, Keighley Road, Frizinghall, Bradford, have reopened their premises for business after reconstruction following a recent fire.

THE GREENWICH CABLE WORKS, LTD., are altering their telephone address to "1011 Greenwich" (two lines). The head office will be transferred from Dashwood House, E.C., to the works at Crooms Hill, Greenwich, in order to obtain the advantage of concentration under the re-arrangements that have recently been made in the management.

BRITISH B.A.G., LTD., have appointed Mr. F. W. Fifield, of 2, Small Street, Bristol, as their agent in the West Country and South Wales area. He will carry stocks.

THE DIRECT ELECTRIC LAMP Co. has removed to 72, Shoe Lane, E.C.4. New 'phone number: "City 7461."

### New Catalogues and Lists.

Messrs. DRAKE & GORHAM, LTD., 36, Grosvenor Gardens, London, S.W.1.—New 16-page catalogue, entitled "Electrification of Works." It contains particulars of questions that arise when electrification of a works is under consideration, and gives excellent photographic views of works that have been electrically equipped by the company—including those of the United Alkali Co., Ltd., at Widnes, the Droylden mills of Ashworth, Hadwen & Co., the workshops of Maythornes, of Biggleswade, Bullivant's works at Dagenham Dock, and the Dacca Twist Mills.

Messrs. FERRANTI, LTD., Hollinwood, Lancs.—Leaflet Wa.405, illustrating and describing the company's "O.P.1" and "O.P.2" radio output transformers.

The MIDLAND ELECTRIC MANUFACTURING CO., LTD., Barford Street, Birmingham.—A folder, illustrated in colour, containing particulars and reduced prices of "Memette" iron-clad switches and fuses.

The HART ACCUMULATOR CO., LTD., Marshgate Lane, Stratford, E.15.—A double-crown poster in colours advertising in an effective manner "Hart" batteries for motor-car starting and lighting.

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.—Leaflet No. F.4,367, describing and illustrating the company's "Wonlite" letter signs. Priced. Also Publication No. F.4,433, containing illustrations and prices of "Wembley" street-lighting lanterns.

WRIGHT MOTORS, LTD., Century Works, Halifax.—List 68, containing particulars and prices of single-, two-, and three-phase induction motors.

VYDA ELECTRICAL CO., Derby Street, Cheetham, Manchester.—Folder, giving priced particulars of "Baby Cardus" a.c. motor starters.

FULLER ACCUMULATOR CO. (1926), LTD., Woodland Works, Chadwell Heath, Essex.—20-pp. pamphlet specially prepared for electrical contractors, dealing with the company's house-lighting batteries of capacities up to 500 ampere-hours, and fitted with Planté positive and box-type negative plates.

LE CARBONE, Coventry House, South Place, E.C.2.—An illustrated price list of "A.D." wet and dry cells and batteries. Full instructions for use are given.

THE WESTINGHOUSE ELECTRIC AND MANUFACTURING CO., East Pittsburgh, Pa., U.S.A.—A folder describing the company's high-resistance voltmeters for h.t. battery eliminators.

### Bankruptcy Proceedings.

I. STEPHENSON, trading as Isaac Stephenson & Son, 36 and 37, Flowergate, Whitby, Yorks., plumber and electrician.—The public examination of this debtor was held recently at the Court House, Stockton-on-Tees. The statement of affairs showed liabilities of £4,568 and a deficiency of £2,778. Debtor stated that prior to 1922 he was employed by his father, who carried on the business. On the latter's death, in April of that year, debtor managed the concern for his mother until August, 1923, when he took it over. He attributed his failure to an agreement with his mother, as the profits were insufficient to meet the expense. The examination was adjourned.

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H. NUTTER, 246, Yorkshire Street, Rochdale, electrical engineer.—The public examination of this debtor was held on June 17th at Rochdale. The statement of affairs showed gross liabilities of £1,975, of which £1,896 was expected to rank, against assets of £150. Debtor attributed his failure to bad trade, lack of capital and law costs. In 1920 he commenced business as an electrical engineer with £96 capital. The business was successful until March, 1922, when his capital had increased to £161. In the year ended March, 1923, he sustained a loss of £400, in the following year £262, and in the next year £231. In 1925-26 there was a profit of £99. He had given a bill of sale on his household furniture and shop fittings to a moneylender, to whom there was now a balance of £43 owing. Debtor denied that his father was a partner in the concern. He said his father had lent money on which interest was chargeable, and had been paid. The examination was closed.

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E. F. WOODGATE, electrical engineer, 7, St. John's Terrace, and Brunswick Cottage, Weymouth.—First and final dividend of 10s. 8d. in the £ payable at the Official Receiver's office, City Chambers, Catherine Street, Salisbury.

J. SPAVEN, electrical and mechanical engineer, 51 and 53, George Street, Bradford.—First meeting, June 30th, at the Official Receiver's office, 12, Duke Street, Bradford. Public examination, July 8th, at the County Court, Bradford.

J. HARRIS, electrical and general engineer, Roseville, Dugdale Street, Nuneaton.—Discharge suspended for two years until May 16th, 1929.

T. E. JONES (B. Jones), electrical engineer, 138, Northgate Street, Chester.—Receiving order made June 20th on debtor's own petition.

C. L. BURRILL and A. J. HEFFER, carrying on business with S. C. Rapson as Suburban Electrical and Maintenance Co., electricians, 2, Plough Yard, Shoreditch, E.—Application for discharge to be heard at Carey Street, W.C., on July 19th.

S. T. HOSKEN, wireless accessories manufacturer and factor, 153, Fleet Street, E.C.4.—Trustee, Mr. C. Latham, 78, New Oxford Street, W.C., released May 23rd.

### Dissolutions of Partnership.

MORRIS, HEATHCOTE & Co., electrical engineers, contractors, radio engineers, &c., 19, Pleasant Street, Blackpool.—Messrs. J. Morris, F. Garnett, and J. W. Heathcote have dissolved partnership. Debts will be attended to by Messrs. Garnett and Heathcote, who will continue the business under the same style.

PAVILION WIRELESS DEPOT, wireless dealers, 132, Mitcham Road, Tooting, S.W.—Mr. M. J. McNiff and Mr. S. A. Taylor have dissolved partnership. Mr. Taylor will attend to debts.

## Company Liquidations.

ESONO, LTD., 492, Prescot Road, Old Swan, Liverpool.—A meeting of creditors was held recently at the offices of Mr. P. S. Booth, Exchange Chambers, Bixteth Street, Liverpool. The statement of affairs presented showed ranking liabilities of £681 and net assets of £174, leaving a deficiency of £507. The issued capital was £1,072, and thus, as regarded the shareholders, there was a deficiency of £1,579. The company was registered in March, 1926, with a nominal capital of £1,500, of which £1,072 was fully paid. The company was formed to take over a business previously carried on at the present address, and also the trade mark "Esono." The amount paid to the vendors was £1,012, which was satisfied by the allotment of shares. During the period to October 1st last there was a net loss of £87. Accounts since that date had not been prepared, but it was evident that a loss had been incurred. An offer had been received for the purchase of the assets of the company for £200, and if it was accepted a claim for £22 would be withdrawn. A resolution was passed confirming the voluntary liquidation of the company, with Mr. Booth as liquidator, and he was instructed to accept the offer. The following are creditors:—

| | £ | | £ |
|---|---|---|---|
| Baxendale & Co., Ltd. | 71 | Dodd & Oulton, Ltd. ... | 41 |
| Bartlett & Son ... ... | 31 | Greenberg, M. ... ... | 23 |
| Calmont, King & Co., Ltd ... ... ... | 60 | Kremner, S. ... ... | 20 |
| | | Rowe Bros. & Co. ... | 60 |

THAMES ELECTRIC WIRELESS CO., LTD., Old Town, Clapham, S.W.4.—A meeting of creditors was held on June 23rd at the offices of Messrs. Mundy, Chudleigh & Co., 93-94, Chancery Lane, W.C. The chair was occupied by Mr. H. C. Mundy, liquidator in the voluntary liquidation of the company. A statement of affairs dated June 7th disclosed liabilities of £757, of which £543 was due to trade and sundry creditors; there was a cash creditor for £57 and a deficiency as regarded the first mortgage debenture holder of £157. The assets were valued at £18, leaving a deficiency of £739. The issued share capital was £100, so that there was a deficiency as regarded the shareholders of £839. The company was incorporated in 1923. The shareholders were Mr. W. Watkins, Mr. S. R. Horsell, and Miss Hall. In June, 1923, £800 was borrowed on debentures from Mr. Watkins, and in May, 1926, Mr. Mundy was appointed receiver, and on the realisation of the assets had paid £700 to the debenture holders. From March 29th, 1923, to March 31st, 1924, there was a profit of £47. In the following year there was a profit of £12, whilst in the next year there was a loss of £543. Subsequently there were further losses of £45 and £266. No resolution was passed, and the voluntary liquidation of the company will be continued with Mr. Mundy as liquidator. The following are creditors:—

| | £ | | £ |
|---|---|---|---|
| Radio Communication Co., Ltd. ... ... | 20 | Hunt, A. H. ... ... | 27 |
| Graham, A., & Co., Ltd. | 305 | Marconiphone Co., Ltd. | 51 |

ROSE BROS. ELECTRICAL CO., LTD.—Winding up voluntarily. Liquidator, Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C. Meeting of creditors, July 7th, at Balfour House. Particulars of claims to the liquidator by July 25th.

ELECTRICAL CABINET WORKS, LTD.—First and final dividend of 1s. 10¾d. in the £, payable at Carey Street, W.C.

H. KAPLAN, LTD. (Elkay Wireless Co.).—Winding up voluntarily. Liquidator, Mr. H. Lever, Chiswell House, Finsbury Pavement, E.C. A meeting of creditors is called for to-day (July 1st) at the liquidator's offices. Particulars of claims to the liquidator by July 14th.

C.A.C. (RADIO), LTD.—A meeting of members is called for July 22nd at the offices of Messrs. Strong & Co., 61, Gracechurch Street, E.C., to hear an account of the winding up from the liquidator, Mr. E. W. Sudlow.

WAREHAM ELECTRIC SUPPLY CO., LTD.—First meeting of creditors and contributors held June 30th at Carey Street, W.C.

## Private Arrangements.

ROSE BROS. ELECTRICAL CO., LTD., 25-27, Milton Street, E.C.2, wireless and electrical manufacturers.—A meeting of creditors was held recently at the Manchester Hotel, E.C., when a statement of affairs was presented which disclosed liabilities of £8,741, all due to unsecured creditors. There were fully-secured creditors amounting to £445, who held security valued at £487. In addition, there were debentures totalling £4,120. There was an estimated amount of £3,231 to meet the claims of the debenture holders, which left a deficiency, so far as the second debenture holders were concerned, of £888. The unsecured creditors, therefore, could not hope to receive any dividend from the estate. It was pointed out that there was also a claim put in by the bank for over £1,000, and the clearing office claimed £1,047. The fully-secured creditors held life policies on the lives of the Rose brothers, which were transferred to the company at the time it was formed. The first debenture holders had appointed a receiver. The second debenture holder was a Mr. Rolfe, who some time ago advanced £2,000. He was employed at a salary by the company, but subsequently resigned and took shares owned by the company in part settlement of his debt. The receiver and manager was at the present time carrying on the business, and it was stated that the sum of approximately £1,000 had been realised so far. The company was registered in 1921 with a nominal capital of £20,000, and was formed to take over an existing business which had been previously carried on for many years by Rose Bros. The company took over the assets and liabilities of the business, and at the time of the formation the first debentures were issued for cash. A solicitor said that the company was prepared to go into voluntary liquidation, and that a nominee of the creditors could be appointed liquidator. It was suggested, however, that endeavours should be made by the creditors to meet the debenture holders if necessary, with a view to seeing if some compromise could be effected, by which a new company could be formed and something given to the old trade creditors. It was eventually resolved, however, to form a committee of inspection consisting of Mr. W. A. J. Osborne, Mr. Booker, representing German interests, Mr. Reynold and Mr. Abrahams.

## Injunction.

We are informed by MESSRS. BRITTAIN'S ELECTRIC MOTOR CO. (formerly Langdon-Davies Electric Motor Co.), of Eastdown Works, Dermody Road, Lewisham, S.E.13, that in the High Court of Justice, Chancery Division, before Mr. Justice Eve, they have obtained an injunction against Messrs. Brittain's Electric Motor Co., *Ltd.*, to restrain them from carrying on in this name, and their representing in any manner that their business was carried on in continuance of, or in succession to, the business of Langdon-Davies Electric Motor Co., or that the business was connected in any way with the original Brittain's Electric Motor Co. (formerly Langdon-Davies Electric Motor Co.).

## Unemployment.

There was a decrease of 60,940 in the number of registered unemployed during the week ended June 13th, the total at that date being 1,028,700, against 1,089,640 on June 6th, and 1,629,940 on June 14th, 1926 (coal stoppage period).

## Prices of Raw Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

| CHEMICALS, &c. | Price June 28th. | Fortnight's inc. or dec. |
|---|---|---|
| *a* Acid, Oxalic ... ... ... ... per lb. | 6¾d. | ... |
| *a* Ammoniac, Sal ... ... ... per ton. | £60 | ... |
| *a* Ammonia, Muriate (large crystal) ,, | £52 | ... |
| *a* Bisulphide of Carbon ... ... ,, | ... | ... |
| *a* Borax ... ... ... ... ,, | £35 | ... |
| *a* Copper Sulphate ... ... ... ,, | £25 10s. | ... |
| *a* Potash, Chlorate ... ... ... per lb. | 4d. to 4½d. | ... |
| *a* ,, Perchlorate ... ... ... ,, | 5½d. | ... |
| *a* Shellac ... ... ... ... per cwt. | £13 10s. | ... |
| *a* Sulphur, Commercial ... ... ,, | £9 10s. | ... |
| *a* ,, Roll ... ... ... ,, | £9 10s. | ... |
| *a* Soda, Chlorate ... ... ... per lb. | 3½d to 3¾d. | ... |
| *a* ,, Crystals ... ... ... per ton. | £5 to £5 5s. | ... |
| *a* Sodium Bichromate, casks ... per lb. | 4d. | ... |
| **METALS, &c.** | | |
| *b* Aluminium, Ingots... ... ... per ton. | £107 to £112 | ... |
| *b* ,, Wire ... ... ... per lb. | 1/6 to 2/- | ... |
| *b* ,, Sheet ... ... ... ,, | 1/3 to 2/9 | ... |
| *p* Babbitt's Metal and Anti-friction Metal— | | |
| Grade I ... ... ... per ton net. | £260 | £1 inc. |
| Grade II ... ... ... ... ,, ,, | £180 | ... |
| Grade III... ... ... ... ,, ,, | £93 | ... |
| *c* Brass (rolled metal 7" to 12" basis) per lb. | 2½d. | ¼d. dec. |
| *c* ,, Tubes (solid drawn) ... ,, | 11¼d. to 11½d. | ... |
| *c* ,, Wire, basis ... ... ... ,, | 9½d. | ¼d. dec. |
| *c* Copper Tubes (solid drawn) ... ,, | 1/0½ | ... |
| *c* ,, Bars (best selected) ... per ton. | £84 | £2 dec. |
| *c* ,, Sheet ... ... ... ,, | £84 | £2 dec. |
| *c* ,, Rod ... ... ... ... ,, | £84 | £2 dec. |
| *d* ,, (Electrolytic) Bars ... ,, | £60 5s. | ... |
| *d* ,, ,, Sheets ... ,, | £148 10s. | ... |
| *d* ,, ,, Wire Rods ,, | £70 5s. | ... |
| *d* ,, ,, H.C. Wire per lb. | 8¼d. | ... |
| *f* Ebonite Rod ... ... ... ... ,, | 2/8 to 2/6 | ... |
| *f* ,, Sheet ... ... ... ,, | 2/8 to 2/6 | ... |
| *a* German Silver Wire ... ... ,, | 2/2 | ... |
| *h* Gutta-percha, fine ... ... ... ,, | 8/- | ... |
| *h* India-rubber, Para fine ... ... ,, | 1/4¾ | ¼d. dec. |
| *l* Iron Pig (Cleveland No. 3.) ... per ton. | 75/- | ... |
| *l* ,, Wire, galv. No. 8, P.O. qual. ,, | £21 | ... |
| *g* Lead, English pig ... ... ... ,, | £26 | ... |
| *g* Mercury ... ... ... ... per bot. | £21 15s. to £22 | 10/- to 20/- inc. |
| *e* Mica (in original cases) small ... per lb. | 3d. to 3/- | ... |
| *e* ,, ,, medium ,, | 4/- to 8/- | ... |
| *e* ,, ,, large ... ,, | 10/ to 20/- & up. | ... |
| *p* Phosphor Bronze, plain castings ,, | 1/8½ | ... |
| *p* ,, ,, drawn bars & rods ,, | 1/8 | ... |
| *p* ,, ,, rolled strip & sheet ,, | 1/9½ | ... |
| *p* ,, ,, wire... ... ... ,, | 1/8½ | ¼d. dec. |
| *c* Platinum ... ... ... ... per oz. | £14 10s. | ... |
| *d* Silicium Bronze Wire ... ... per lb. | 10½d. | ... |
| *r* Steel, Magnet, in bars ... ... ,, | 7½d. | ... |
| *a* Tin, Block (English) ... ... per ton. | £293 5s. to £293 15s. | 25/- inc. |
| *a* ,, Wire, Nos. 1 to 16 ... ... per lb. | 4/9 | ... |

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

*a* G. Boor & Co.
*b* The British Aluminium Co., Ltd.
*c* Thos. Bolton & Sons, Ltd.
*d* Frederick Smith & Co.
*e* F. Wiggins & Sons.
*f* India-Rubber, Gutta-Percha and Telegraph Works Co,. Ltd
*g* James & Shakespeare.
*h* Edward Till & Co.
*l* Bolling & Lowe.
*l* Richard Johnson & Nephew, Ltd.
*n* P. Ormiston & Sons.
*o* Johnson, Matthey & Co., Ltd.
*p* C. Clifford & Son, Ltd.
W. F. Dennis & Co.

### For Sale.

The Liverpool Overhead Railway invites offers for seven sets of engines, boilers, generators, boosters, switchboard, &c. Barrow-in-Furness Electricity Department invites offers for surplus generating plant, including steam generators, water-tube boilers, surface condensers, blowers, &c.

By instructions of the Receiver of the General Battery Co., Ltd., Mr. J. Sulley will sell by auction at 47, Campbell Road, Finsbury Park, N., on July 6th, all the interest of the debenture holders in the business of a battery manufacturer, together with the plant, machinery, utensils, and office furniture.

By order of the Barking Town Urban District Council, Messrs. Fuller, Horsey, Sons & Cassell will sell by auction on July 14th, at the Baltic Exchange, electrical generating plant, including a 1,000-kW Brush-Ljungström turbo-alternator, &c. (See our advertisement pages to-day.)

### Swedish Electrical Exports.

The *Swedish Economic Review* (the organ of the Swedish Board of Trade) states that during the first four months of this year electrical machines to the value of 10,390,000 kr. were exported from Sweden, as compared with 8,277,000 kr. in the corresponding period of 1926. The exports of telephone and telegraph apparatus had a value of 2,630,000 kr.( against 1,650,000 kr.).

### Social Event.

The staff of Siemens Lamp Works, Preston, held a golf competition on June 18th over the golf links of the Dick, Kerr Club at Ashton Park, Preston. The competition, which was for the "Dr. Wright prize," took the form of two-ball foursomes. The leading returns were Messrs. W. T. Le Marechal, Junr., and F. J. Jones, 83; P. D. Oakley and F. Price, 83; J. N. Aldington and W. H. Le Marechal, 84. In a deciding match Messrs. Le Marechal and Jones were successful.

# Lighting and Power Notes.

**Algeria.** — ELECTRICAL DEVELOPMENT. — The Société Algerienne d'Eclairage et de Force, in its recently-issued report for last year, states that the output from its Hussein-Dey power station, which serves the Algiers district, amounted to 34,316,640 kWh, as compared with 30,848,317 kWh in the preceding year. In order to meet the increasing demand two new turbo-alternators of 6,400 kW have recently been installed. The output from the Mers-el-Kebir station, which serves the Oran district, increased from 8,185,590 kWh to 10,084,330 kWh. At this station a new 6,400-kW turbo-generator is being installed and a 30,000-V line erected to transmit electricity to the Mascara district.

**Blackburn.**—INQUIRY.—Mr. A. H. Dykes, consulting engineer, of London, has accepted the invitation of the Town Council to conduct an inquiry into the administration of the Electricity Department, this being at the express request of Mr. P. P. Wheelwright, the borough electrical engineer.

**Dover.**—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer, Mr. R. C. Harpur) for the year ended March 31st last, show a total revenue of £50,953, as compared with £55,817 in 1925-26. Working expenses amounted to £30,773 (£25,964), leaving a gross profit of £20,180, as against £29,853, to which was added a balance of £2,602 brought forward from the previous year, making a total of £22,782 available. This was distributed as follows:—Interest, £11,901; sinking fund, £7,048; stock redemption fund, £751; cooling pond site-instalment, £118; depreciation, £1,000; balance carried forward, £1,964. The capital expenditure during the year amounted to £11,096, bringing the total to £307,541. The total kWh sold was 2,859,025, a decrease of 6.9 per cent., as compared with the preceding year, and the average price obtained per kWh fell from 4.36d. to 4.27d.

**Dumfries.**—HYDRO-ELECTRIC PLANT.—The new hydro-electric plant installed by the Town Council at the auxiliary station in Maxwelltown has now been completed, and a series of tests have proved successful.

**Ellesmere.**—ELECTRICITY SUPPLY.—The Urban District Council has decided to communicate with the Electricity Distribution of North Wales and District, Ltd., with respect to a supply of electricity for the town.

**Glasgow.**—PROGRESS DURING MAY.—During May, under the Corporation Electricity Department's scheme, 110 houses were wired, making the total to date 3,663. Under the 10 years' hire-purchase scheme there were 185 agreements, making the total now 586. The number of applications for the hire of appliances was 195, making the total to date 15,090.

NEW SUB-STATIONS.—The Corporation has been granted a warrant at the Dean of Guild Court to erect sub-stations at Cathcart Road and in Shawlands.

**Greenock.**—ELECTRICITY EXTENSION.—The Corporation recently discussed a proposal to supply electricity to Inverkip and Wemyss Bay. On the ground that under the proposed conditions Greenock would lose annually, it was moved that the scheme be postponel. It was contended that the scheme would cost £10,000 at least, and that the figure given as profit was £86 per annum. It was decided that the proposal should be further considered.

**Grimsby.**—LOAN.—The Corporation Electricity Committee is applying for sanction to the borrowing of £12,000 required in connection with a scheme for the supply of electricity in Humberstone Avenue, Louth Road, and Holton-le-Clay.

**Higham Ferrers.**—INQUIRY.—An inquiry was held recently by Sir William Marwood, K.C.B., into the application of the Rushden and District Electric Light Co. for permission to erect overhead cables in the town. Objections were made by the Town Council. Mr. W. Phethean, for the company, said that the maintenance cost of overhead mains was estimated at one-third of the cost of underground cables.

**Huddersfield.**—LOANS.—The Town Council has applied for sanction to loans of £20,000 for mains and services, £3,000 for meters, and £2,000 for cooking and heating appliances.

**Hull.**—YEAR'S WORKING.—The report on the working of the Corporation electricity undertaking (engineer, Mr. H. Bell) for the year ended March 31st last, shows a total income of £412,960, as compared with £338,906 in the preceding year. As a result of the coal dispute and the consequent increased cost of fuel, working expenses increased from £189,371 to £235,795, leaving a gross profit of £177,163 (£149,535), to which were added unemployment grants and excess of sinking fund investments, making a total of £180,611. After providing for capital charges there was a net surplus of £84,595 (£65,693), of which £5,556 was contributed to the district fund, and the remainder placed to reserve. The capital expenditure during the year amounted to £150,527, and included £46,274 for buildings, £62,639 for machinery, and £34,937 for mains and services. The electrical energy sold increased from 60,540,483 to 61,523,774 kWh, and the maximum supply demanded from 24,460 to 25,100 kW. A further 7,000-kW set and two 50,000-lb. water-tube boilers were installed during the year, and the preliminary foundation and building work was commenced for two additional sets of 12,500 kW. When these are installed the total capacity of the station will be 54,000 kW.

**Japan.**—ELECTRICAL DEVELOPMENT.—It is reported that the Tokyo Dento K.K. plans erecting a sub-station of 30,000 kW at Yumoto Fukush Ima-ken, and laying a transmission main 43 miles in length from Shirakawa in the same prefecture to Yumoto, as a result of a contract concluded recently with the Iwaki Colliery Co. for the supply of 20,000 kW.

With reference to the South Manchurian Railway electrification project, it is understood that the necessary power will be supplied by the newly-established South Manchurian Electric Co., which has plant with a generating capacity of 8,000 to 10,000 kW at the Hama-cho power station, and of 8,000 kW at the Amanogawa power station, of which amount 10,000 kW is supplied at present and 7,000 kW not disposed of. As the electrification plan will be applied at first to the Bier Line at Dairen, there will be an adequate supply for it without increasing the existing capacity.

**Leeds.**—YEAR'S WORKING.—We have received from Mr. C. Nelson Hefford, manager of the Corporation electricity undertaking, a copy of his report, together with the statement of accounts for the year ended March 31st last. The total revenue amounted to £638,792, as compared with £563,902 in the preceding year. Working expenses rose from £222,610 to £345,723, for which the increased cost of coal was mainly responsible, leaving a gross surplus of £293,069 (£341,292). After meeting capital charges there was a net profit on the year's working of £14,819, as compared with £74,018 in 1925-26. Out of this profit the sum of £28,929 has been absorbed as contribution to capital expenditure, leaving a deficit of £14,110, as compared with a surplus of £41,656 in the previous year. The capital expenditure amounted to £264,234, and the amount now spent on the undertaking stands at £4,389,231. The sales of electrical energy increased from 100,779,954 to 106,415,644 kWh, the residential bulk supplies on the ratable value system showing an increase of 48.57 per cent. The average price obtained per kWh increased slightly from 1.34d. to 1.44d. During the year 116 miles of mains were laid and 18 sub-stations and kiosks constructed and equipped. Sanction was received in April last to the construction of a new generating station on the Redcote Farm estate.

**London.**—HAMPSTEAD.—*Year's Working.*—The accounts of the Borough Council's electricity undertaking (engineer, Mr. J. Leadbeater) for the year ended March 31st last, record a total revenue of £163,321. Working expenses, including the purchase of electricity in bulk, amounted to £125,308, leaving a gross profit of £38,012. After meeting capital charges, there was a net profit of £27,698, to which was added revenue from other sources, making a total of £30,079. Contributions to capital outlay absorbed £28,575, and the final result was a surplus of £1,504. The capital expenditure during the year amounted to £28,575, the chief item being £8,063 for mains. The sales of electricity increased from 13,787,382 to 15,777,271 kWh, and the maximum supply demanded from 7,960 to 9,270 kW. The average price obtained per kWh rose from 0.9d. to 1.17d.

STEPNEY.—The borough electrical engineer has recommended that consumers using electricity for lighting be allowed to use it for heating, cooking, and the operation of

small domestic apparatus using motors not exceeding ¼ h.p. at a charge of 1d. per kWh. The Electricity Committee has adopted the recommendation.

**Manchester.**—REVISED ELECTRICITY CHARGES.—The Electricity Committee has recommended the introduction of a new tariff for cooking, for business purposes, for a "restricted hours" supply outside the heaviest afternoon hours, 3.30 p.m. to 5 p.m. in November, and the three succeeding months. The charge is to be 1d. per kWh, and for an unrestricted supply an additional charge of £4 per kW of maximum demand per annum, the cooking installations to consist of not less than 10 kW. A reduction of ¼d. per kWh is recommended in the existing compound and "restricted hours" supplies.

**Middlesbrough.**—ELECTRICITY IN BULK.—The Electricity Commissioners having refused to allow the Corporation to establish its own generating station, it has decided that negotiations be opened with the Cleveland and Durham Power Co. with a view to a new contract being arranged for a supply of electricity in bulk.

**New Zealand.**—ARAPUNI SCHEME.—According to the *New Zealand Engineer*, the erection of 528 galvanised steel standards, ranging in height from 66½ ft. to 96½ ft., from Arapuni to Penrose, for the transmission of electricity from the Arapuni hydro-electric works to Auckland, is now nearly completed. The cost of the work is estimated at £220,000.

**North Berwick.**—INAUGURATION OF SUPPLY.—The ceremony of switching on the electricity supply from the newly-erected transformer house was performed by Provost Sim on June 17th. Electricity is obtained in bulk at 11,000 V, and distributed throughout the town at 400 V and 230 V. Over 10,000 yards of mains have been laid.

**Price Reductions.**—Reductions in the charges for electricity have been made or recommended in the following districts:—

CREWE.—Lighting: From 5d. to 4½d. per kWh. Power, &c.: On the sliding scale to 2½d. and 1½d. per kWh. These charges are subject to a discount of 2½ per cent., for prompt payment of accounts.

BURNLEY.—Lighting: Within the borough, from 5d. to 4½d. per kWh; outside the borough, from 6d. to 5½d. per kWh.

WEST HAM.—Lighting: Sliding scale varying from 4½d. per kWh for the first 50 kWh per quarter to 3d. per kWh for all electricity in excess of 8,800 kWh; prepayment meters, 5d. per kWh; factories, up to 10 per cent. of the quarterly power consumption, or 15 per cent. of the monthly power consumption, 3d. per kWh. Power: First 40 kWh per h.p. installed, per quarter, 3d. per kWh; all in excess of 40 kWh per h.p., 1d. per kWh. Heating and cooking: 1d. per kWh. Domestic tariff: Varying from 7s. per lamp per annum for three 60-watt lamps installed, to 3s. 10d. for 16 lamps, plus ¾d. per kWh for electricity consumed. The above charges, with the exception of lighting through prepayment meters, are subject to a discount of 5 per cent. for prompt payment of accounts. Theatres, &c.: 3d. per kWh., less discount. Traction: First 6,000,000 kWh, 1d. per kWh; above this amount, 0.9d. per kWh. Public lighting: £4 15s. per standard. Revisions have also been made in the special agreement supplies.

**Raunds.**—INQUIRY RESULT.—As an outcome of an inquiry in December last into the objections of the Urban District Council to the Rushden and District Electric Supply Co.'s main transmission line from Raunds to Thrapston, the Ministry of Transport has informed the Council that consent has been given to the placing of certain overhead lines in the urban district and the rural district of Thrapston for the transmission of electricity at pressures of 11,000 V, 215-365 V, and 250-430 V.

**Sheffield.**—ARBITRATION AWARD.—The award in the arbitration proceedings, to determine what sum the Sheffield Corporation should pay the Yorkshire Electric Power Co., Ltd., as a result of the Corporation taking over the company's plant when Wadsley Bridge was absorbed into the city, was received last week. The amount claimed by the company was £106,156, and the valuation submitted on behalf of the Corporation was £16,960. The amount awarded by the arbitrator, Mr. W. H. Patchell, is £68,000. The claim of the company was based on the principle that it was entitled to potential profits until 1941, in which year, it was estimated, the consumption of electricity per head of the population would be 700 kWh, which consumption was declared to be the saturation point.

**Special Orders.**—Application has been made to the Electricity Commissioners by Luton Corporation for a Special Order authorising it to supply electricity in part of the rural district of Ampthill.

The Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the Aldershot Gas, Water, and District Lighting Co. to supply electricity in part of the urban district of Fleet and parts of the rural districts of Basingstoke, Hartley Wintney, Guildford, and Hambledon.

**Stirling.**—NEW SUB-STATION.—The Corporation is to borrow £3,500 to meet the cost of erecting a sub-station at Forth Street with the necessary plant to take electricity in bulk from the Scottish Central Electricity Supply Company.

**Stranraer.**—ELECTRICITY SUPPLY.—A definite proposal regarding an electricity scheme for the town was submitted at a recent meeting of the Town Council by Mr. Duncan McLennan, consulting engineer, Alloa. A committee was appointed to go into the matter and report.

**United States.**—ELECTRICAL DEVELOPMENT.—The *Electrical World* reports that the New Jersey Power & Light Company, a subsidiary of the General Gas & Electric Corporation, has started the construction of another steam-electric generating plant for the Pennsylvania-New Jersey power system. This plant will be built on the Delaware River at Holland, N.J., nine miles south of Easton, Pa., and will have an ultimate capacity of 250,000 kW. The first unit, which will have a rating of 40,000 kW, is expected to be in operation in 1928.

Construction has commenced on a 100-mile, 220-kV steel-tower transmission line for the Great Western Power Company of California which will connect the Bucks Creek power house, now being built, with the company's Brighton sub-station at Sacramento. The line, which will cost $1,920,000, is an extension of the 102-mile Sacramento-Merced line completed about a year ago. When both these lines are in operation this company will have approximately 202 miles of line at that voltage from its power plants on the Feather River to the Wilson sub-station at Merced, where interconnection is made with the system of the San Joaquin Light & Power Corporation.

**Wakefield.**—LOAN SANCTIONED.—The Corporation Electricity Committee has received sanction to a loan of £15,000 for mains and services.

**Walton-on-Thames.**—PURCHASE OF UNDERTAKING.—The Urban District Council has received an amended sanction to a loan of £96,000 for the purchase of the local electricity undertaking.

**Worcester.**—LOANS.—The City Council is to apply for sanction to loans amounting to £13,800, for mains (£3,000), services (£3,000), transformers and sub-stations (£7,800).

YEAR'S WORKING.—Regarding the last year's accounts, the chairman of the Electricity Committee states that the cost of generation increased by £8,600, and £7,800 of that was due to the advance in the cost of coal. The distribution costs amounted to £66,098. The gross profit was £24,364, and the net profit £3,770.

# Tramway and Railway Notes.

**Australia.**—SYDNEY.—The *New Zealand Engineer* states that according to the plans of the New South Wales Government, the main suburban railway service of Sydney will be electrified by January 1st, 1929, and the remainder of the suburban lines by November 1st, 1930. An electric service has been in operation on the Illawarra section since last December, and in three months the passenger receipts showed an increase of 20 per cent. The cost of the electrification of the suburban railways and the construction of the city railway, including the proportion of the building of the harbour bridge to be borne by the railways, is estimated at £25,736,000. Twopenny fares on the city railway will have to provide working expenses and maintenance and interest on the capital of £6,950,000. The traffic on the railway over the harbour bridge will be called upon to provide for payment of interest on a capital of £4,000,000. The electrification and widening of the suburban lines is to cost £8,981,000.

**Continental.**—GERMANY.—The increase in traffic on the electrical sections of the railways in Silesia and Saxony and the development of electric traction in Bavaria have led to a large number of electric locomotives being required. The requirements for 1928 are 88 locomotives, 15 rail motor-cars, and 15 control cars. In order to make sure of punctual delivery, the Reichsbahn Gesellschaft has already ordered the material. For Bavaria seven 2,200 h.p. fast-train locomotives of a similar type to those now running have been ordered from Brown, Boveri & Cie. at Mannheim and the Lokomotivfabrik Krauss at Munich. Thirty-three fast-train locomotives of 2,600 h.p. are on order from the Allgemeine Elektricitäts Gesellschaft, the Siemens-Schuckertwerke, and the Porsig concern. These engines are for heavy work in Bavaria, Silesia, and Saxony. Five fast-train locomotives for lighter work in Saxony are to be built by the Bergmann Elektricitäts-Werke and the Berliner Maschinenbau Aktiengesellschaft vormals L. Schwartzkopff. As regards goods-train engines, orders for 12 for very heavy trains have been placed, and 23 for lighter loads. The rail motor-cars and control cars are for the Bavarian lines. The total cost of these cars will be about 34,000,000 marks.—*Reuter's Trade Service* (Berlin).

FRANCE.—Good progress is being made with the electrification of the French railways. The latest section to be opened for electric traffic is that from Bordeaux to Hendaye, on the Midi railway. The Midi railway system now has 317 miles of electric lines, the overhead system being adopted. The new line was inaugurated by M. Tardieu, Minister of Public Works, and the 2,250-h.p. engine, fifteen metres long and weighing 103 tons, took 1¼ hours to cover the 124 miles, thus running at an average speed of about 72 miles per hour.—*Reuter* (Paris).

**Glasgow.**—TRAMWAY DEFICIT.—It is reported that the working of the Corporation tramway department for the past year has resulted in a deficit of £78,632, of which the tramway section accounted for £33,178, the subway £35,496, and the motor-omnibus service, £9,956. There would have been a surplus of £30,000 on the tramway section but for the coal dispute.

**Hastings.**—PARLIAMENTARY BILL.—At a recent meeting of the Bexhill Corporation, the town clerk reported receipt of a letter from the town clerk of Hastings, referring to the Hastings Tramways Bill and to the position of the Hastings Corporation thereunder. The Hastings Council considered that an improvement in existing transport facilities at Hastings was imperative, but was strongly in favour of the substitution of a system of motor-omnibuses rather than a railless-car system. It was suggested that a solution of the difficulty might be found by the acquisition of the tramway undertaking, and negotiations had already been set on foot with the Hastings Tramway Company with this view. The Hastings Corporation invited the co-operation of the Bexhill Corporation in dealing with the transport problem of the district as a whole, and asked that a committee might be appointed to act with a committee of the Hastings Corporation to deal with the situation. After consideration, the Council expressed the view that the purchase of the undertaking of the company by the local authorities would not contribute a satisfactory solution to the transport problem in Hastings and Bexhill, and it preferred that the proposals of the company, contained in the Bill now before Parliament, should proceed.

**London.**—NEW ELECTRIC TRAIN.—*The Times* reports that the Metropolitan Railway recently exhibited at Baker Street station a new electric train, which is capable of maintaining a speed of 65 miles an hour. This train, which will form the standard for all future Metropolitan electric rolling stock, is the most powerful in the United Kingdom, and has a horse-power of over 2,500 and a tractive effort, on starting, of over 30,000 lb. It is capable of attaining a speed of 30 miles an hour in less than 30 seconds, while a marked smoothness of running and flexibility of operation are also claimed for it. It will also have 50 per cent. better lighting. The train will be used on the Watford service and will bring this town within approximately half-an-hour's journey of Baker Street.

# Telegraph and Telephone Notes.

**China.**—LONG-DISTANCE TELEPHONY.—Connection between Peking and Dairen, in Kwantung leased territory, by Chinese and Japanese long-distance telephone services has been established. The Dairen-Taonan line is also in operation.

**France.**—RAILWAY TELEGRAPHY.—The French telegraph service has decided to inaugurate a system by which urgent telegrams may be sent to passengers travelling by certain express trains on the P.L.M., Paris-Orleans, and Est railways.

**Hull.**—TELEPHONE SERVICE.—The city of Hull's municipally-owned telephone undertaking made a profit of £14,000 during the past 12 months, after paying £11,000 in royalties.

**Portugal.**—TELEPHONE RATES.—The rates for three-minute telephone conversations on the State lines have been increased by 33 per cent.—*Reuter* (Lisbon).

**South Africa.**—"BEAM" RADIO-TELEGRAPHY.—The seven-days' official test by the General Post Office of the "beam" wireless service with South Africa commenced on Friday morning, June 17th, and was completed at 10 o'clock on June 24th. While the tests have so far been highly successful, no authoritative statement as to the results can be made until the official certificate has been received by Marconi's Wireless Telegraph Co., Ltd., from the General Post Office.

The first experimental tests showed that communication between England and South Africa could be maintained for a longer period than the 11 hours required under the conditions of the Marconi guarantee to the Post Office, but it became clear that the wave-length originally selected was too long to give the maximum period of communication during daylight hours, and the change of wave-length necessitated certain modifications not only in the transmitter itself, but also in the aerial and feeder systems. It is estimated by the Marconi Company that the stations are capable of handling about 160,000 words per day in each direction; that high-speed duplex operation at speeds of over 100 words per minute during the seven-days' official test amounted to a daily average of 17 hours 50 minutes; and that the average total hours of good traffic operation were 22 hours outwards to South Africa and 20 hours inwards from South Africa. The stations use two wave-lengths, 16 metres for daylight and 33 metres for night communication: the standard time of the Union of South Africa is only two hours fast of Greenwich mean time, and sunrise and sunset in both countries therefore occur at nearly the same time; thus the signals in the path of the beam between the two countries travel almost completely in darkness or in daylight.

**Telephone Filters.**—ALUMINIUM FILM TYPE.—In a modern telephone system a battery of accumulators at the central office serves as a common reservoir of energy for talking and signalling. It is necessary to charge this battery while it is connected to the system; the alternating components of voice frequency in the output of the charging generators make themselves apparent in the form of objectionable noise in the telephone lines, and therefore great pains are taken to design the direct-current generators so as to eliminate all ripples from the voltage wave, which doubles the cost of the machines, reduces their efficiency, and increases maintenance cost. According to *Nature*, Mr. Siegmund, of the Bell Laboratories, U.S.A., recently described a filtering device which prevents the disturbing ripples from entering the talking circuit, even when only a cheap commercial dynamo is used for charging. As condensers having capacities of several thousand microfarads have to be employed, the device would not be economical were it not for the high capacities and the little space occupied by aluminium electrolytic condensers. When an aluminium rod is maintained positive to a suitable electrolyte, a very thin non-conducting film is formed on it, which forms the dielectric of the condenser; the electrolytic condenser resembles a single-cell storage battery. The anode plate is corrugated and the cathode plate is flat. They are fastened to the porcelain cover of the jar. For 24-volt operation one jar has a capacity of about 1,000 microfarads. They require no routine maintenance; oscillograph records prove the utility of the device.

**Transatlantic Telephony.**—NUMBER OF CALLS.—On June 21st it was announced by the Postmaster-General, Sir W. Mitchell-Thomson, in Parliament, that the total number of telephone calls that had passed from Great Britain to the United States was 485, a daily average of three. The total number of calls from the United States was 612, a daily average of 4. The number of calls originating from London was 435, and the number from the provinces 47. The question of charges would undoubtedly receive consideration in the future, but some of the calls were of considerable duration—a quarter of an hour or more. The service covered working expenses.

**Turkey.**—CABLE CONCESSION.—The Turkish Parliament recently ratified an agreement with the Eastern Telegraph Company by which a concession is granted for thirty years, says the *Financial Times*. A cable-ship is already on its way to restore the Odessa-Constantinople cable.

# Radio Notes.

**Canada.**—TRANSATLANTIC RELAY.—The most ambitious "tie-up" of radio stations ever attempted and the longest broadcast are being arranged for by a committee of experts in connection with the celebration of the jubilee of Confederation, says the London *Evening News*. It is anticipated that the programme from Ottawa will start at 4 p.m. on July 1st (10 p.m. in England); it will be relayed over telephone wires to Drummondville, Quebec. Thence it will be transferred across the Atlantic by the Marconi "beam," picked up in England, and sent by telephone lines to London, where it will be distributed by the stations of the British Broadcasting Corporation throughout Great Britain and Europe. The King's message to Canada will follow the same route reversed.

**"Community Radio."**—A NEW COMPANY.—Under the title of Community Radio, Ltd., a company, the first of its kind in the country, is to supply wireless to houses in Lytham-St. Annes in a similar manner to water and gas services. The fee of 2s. a week covers everything, and programme items are to be available every day from noon to midnight.

According to *The Times*, the company, which already has 40 subscribers, spread over a wide area at St. Annes, has had inquiries from other towns, including Blackpool and Lytham-St. Annes. Mr. H. Holmes originated the idea of a subscribers' service, on payment of 2s. a week, with the licence included. For this sum, a wire will be run from the central receiving station to the house, and a loud-speaker will be provided for reproducing the Daventry programme. The subscriber will merely switch on or off in the same way as he does the electric light. Plans have been prepared for a bigger receiving station in the open country, and lines will be run into the town. The service will be opened wherever it is demanded, and there will soon be a dual service with the choice of two programmes. The British Broadcasting Corporation and the Post Office have raised no objection.

**India.**—STATION INAUGURATION.—As has already been announced, the Bombay station of the Indian Broadcasting Co. is to be inaugurated at 5 p.m. on July 23rd by Lord Irwin, the Viceroy. According to *World Radio*, the stations have been allotted call signs and wave-lengths as follows:—Bombay, 7BY, 357.1 metres; Calcutta, 7CA, 370.4 metres; other stations are to be established later.

IMPORTS.—Our correspondent in India reports that the imports of wireless apparatus into India in 1926-27 amounted in value to Rs.5 lakhs, as against Rs.6 lakhs in the previous year. The imports came principally from the United Kingdom.

# Contract Information.

**When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.**

## Contracts Open.

**Australia.**—MELBOURNE.—August 15th. Postmaster-General's Department. One 55-ton 3-motor-type electrically-operated overhead travelling crane. (A.X. 4727.)*
August 16th. Automatic telephone exchange equipment. (B.X. 3566.)*
August 31st. Victorian Railways. Electric transporter. Particulars from Contractors' Room, Spencer Street.
November 14th. One 40-ton electrically operated travelling crane.
November 14th. State Electricity Commission of Victoria. Two 10,000-kW back-pressure turbo-generators and accessory plant. (See this issue.)
November 21st. Five centrifugal feed pumps. 28 4-h.p. water tube boilers and accessory plant and steel work for buildings.
SYDNEY.—July 18th. Municipal Council. Boiler-house equipment for the Bunnerong power station. (B.X. 3531.)*
August 15th. Generator neutral earthing resistance. (B.X. 3550.)*

**Dunfermline.**—July 11th. Town Council. Electric lighting installation for 52 houses. Schedules from Mr. R. Muir Morton, burgh engineer, City Chambers, Dunfermline.

**Dublin.**—July 6th. Port and Docks Board. Two 200-yd. lengths of 0.4 sq. in. single rubber-insulated, lead-covered, single armoured 600-V submarine cable. Secretary, Port and Docks Board, Westmoreland Street, Dublin.

**Flint and Hope.**—July 5th. Flintshire E.C. Electric light installation at schools. Mr. R. G. Whitley, county architect, Mold.

**Glasgow.**—July 4th. Corporation. Electric lighting installations for 510 houses at Knightswood. Specifications, &c., from Town Clerk.

**Haworth.**—July 5th. Installation of electric lighting at Haworth Council school. Specifications from Mr. B. Leah, Education Office, Bingley.

**Hetton-le-Hole.**—July 12th. Urban District Council. Overhead mains, lamps and fittings for street lighting by electricity within the district. Particulars from Mr. G. Young, Clerk to the Council, Council Chambers, Hetton-le-Hole.

**Huddersfield.**—July 4th. Education Committee. Electric lighting installation, Almondbury, Berry Brow, Crosland Moor and Paddock schools. Borough architect, 26, Ramsden Street.

**Ilford.**—July 12th. Electricity Department. Two transformer kiosks including transformers and switchgear, &c., the switch kiosk, including switchgear. (See this issue.)

**Kirkcaldy.**—July 2nd. Electricity Department. L.p a.c. distribution, l.p. and e.h.p. cables, boxes, and roadwork. (June 10th.)

**London.**—STEPNEY.—July 11th. Electricity Supply Department. Boilers and boiler-house accessories, turbo-alternator, condenser, accessories, and switchgear. (June 3rd.)

LEWISHAM.—July 4th. Board of Guardians. Steam and electric steriliser plant, for the operating theatre. Mr. G. W. Martin, consulting engineer, 33, Arran Road, Catford, S.E.

METROPOLITAN ASYLUMS BOARD.—July 13th. Overhauling and repairing two Willans & Robinson electric generating sets at Colindale Hospital. (See this issue.)

**Newcastle-under-Lyme.**—July 11th. Electricity Supply Department. 350-kW rotary convertor, with e.h.p. and l.p. switchgear. (June 24th.)

**New Zealand.**—WELLINGTON.—August 9th. Public Works Department. 1,500 suspension insulator strings and 470 strain insulator strings. (B.X. 3533.)*
September 13th. Two sets 110-kV outdoor switchgear for the Waikato electric power scheme. (B.X 3579.)*
October 4th. Batteries and charging sets for Mangahao electric power scheme. (B.X. 3580.)*
August 18th. Corporation Tramways. One electrically-operated tramcar traverser. (A.X. 4801.)*

**Plymouth.**—July 6th. Mental Hospital Visiting Committee. 50-h.p. oil engine electric generating set for the mental hospital, Blackadon. Town clerk, Municipal Buildings.

**Shitlington, West Riding.**—July 19th. West Riding Education Committee. Electrical installation for the Middlestown new school. Specifications, &c., from Education Department, County Hall, Wakefield.

**Singapore.**—July 25th. Municipal Commissioners. One 10,000-kW turbo-alternator and condensing plant. (June 24th.)

**South Africa.**—PIETERMARITZBURG.—July 13th. City Council. Single- and 3-phase electric motors and starting switches for 12 months. City Electrical Engineer.

**Southend-on-Sea.**—July 6th. Light Railways and Electricity Department. L.p. and e.h.p. cables for 12 months. (June 3rd.)
July 5th. 3,000 meter boards. (June 17th.)

**Uruguay.**—MONTEVIDEO.—August 5th. State Electricity Works. 16,522 l.p. a.c. meters and spares. (B.X. 3596.)*

**Warrington.**—July 18th. Electricity Committee. Twelve months' supply of e.h.p. and l.p. paper and lead-covered cables. (See this issue.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

## Contracts Closed.

**Armagh.**—City Council.
Generating plant.—Blackstone & Co., Ltd. (£3,270); National Gas Co., Ltd. (£3,625); Campbell Gas Engine Co., Ltd. (£3,815); Marshall Sons & Co., Ltd. (£4,125).

Seventeen tenders were received. The engineer (Mr. Spalding) was authorised to visit the works of the four selected firms and accept the most satisfactory tender.

Main switchboard (£375).—Metropolitan-Vickers Electrical Co., Ltd.
Overhead travelling crane (£173).—Herbert Morris, Ltd.
Distribution mains and public lighting (£4,656).—Irish Construction Co., Ltd. (English-made cables to be used.)

**Australia.**—MELBOURNE.—Town Hall and Baths Committee. Recommended:—
Lighting fittings, &c., for the Town Hall (£1,114).—British General Electric Co., Ltd.

This tender provides that the whole of the metal work will be manufactured in Australia, and that the present glassware, to the value of £150, will be made in England. The tenderers state, however, that if the Council desires it, arrangements can be made to obtain blown glassware manufactured in Australia at an increase of £380 on the amount of the tender, thereby bringing the total amount of the tender for the goods wholly manufactured in Australia to £1,494.

State Electricity Commission of Victoria.
Aluminium cable.—British Insulated Cables, Ltd.
Conveyor plant for conveyors under bunkers (in lieu of contract awarded to Johnston & Ashton) (£663).—J. W. Stamp.
SYDNEY.—City Council. Recommended:—
50-amp. a.c. consumers' meters (£1,275).—Electricity Meter Mfg. Co.
Coal-handling plant for Bunnerong power station, including spares (£71,336).—Mort's Dock and Engineering Co., Ltd.
Four diaphragms for turbines (£440).—Metropolitan-Vickers Electrical Co., Ltd.

—*Tenders.*

**Basingstoke.**—Town Council. Accepted:—
Cables for the Hackwood Road housing scheme (£753) and for service cables (£119).—Pirelli-General Cable Works, Ltd.
Bare copper conductors (£179).—W. T. Henley's Telegraph Works Co., Ltd.
Exhaust pipes (£33).—Stanton Iron Works, Ltd.

**Bexhill.**—Electricity Committee. Recommended:—
1,000 yd. service cable (£141).—Hackbridge Cable Co., Ltd.

**Dublin.**—Borough Commissioners.
Condensing plant:—

| | |
|---|---|
| Metropolitan-Vickers Electrical Co., Ltd. ... | £9,000 |
| Mirrlees, Watson & Co., Ltd. ... ... ... | 9,464 |
| Worthington, Simpson, Ltd. ... ... ... | 10,386 |
| **Oerlikon, Ltd.** (Accepted.) ... ... ... | **10,386** |
| Escher, Wyss & Co., Ltd. ... ... ... | 10,575 |

It is stated that the Worthington, Simpson and the Oerlikon tenders were the only ones to comply with the specification. —*Irish Builder and Engineer.*

General Post Office. Accepted:—
Lamps.—Edison Swan Electric Co., Ltd.

**Glasgow.**—Housing Committee. Recommended:—
Electric lighting installations at housing estates.—Govanhill, £628, John Wright; Shettleston, £605, D. Henderson; Germiston, £1,574, and M'Neil Street, £996, J. Laird & Co.

Tramways Committee. Recommended:—
Trolley wire.—T. Bolton & Sons, Ltd.; British Insulated Cables, Ltd.; and F. Smith & Co., Ltd.
Storage battery.—Hart Accumulator Co., Ltd.

**Grimsby.**—Electricity Committee. Recommended:—
Equipment of two boilers with the Detrick Usco arch (£1,426).—Stirling Boiler Co., Ltd.

**London.**—STEPNEY.—Electricity Committee.
3,000 yd. 1-in. white tape (£237).—W. White & Co. (Accepted.)
2 tons plumber's solder, ½ ton tinman's solder (£261).—G. W. Neale, Ltd. (Accepted.)
25 tons of pitch (£109).—Forbes, Abbott & Lennard, Ltd. (Recommended.)
300 current limiters (£240).—Electrical Utilities, Ltd. (Recommended.)
50 cast-iron chambers and covers (£91).—J. Warner, Ltd. (Recommended.)
Overhead crane for Princes Square sub-station (£521).—(Recommended.)
Repairs to bunkers, Limehouse generating station (£420).—Saunders & Forster, Ltd. (Recommended.)

ST. MARYLEBONE.—Electricity Supply Committee. Recommended:—
Twelve months' supply of cables—
L.p. and e.h.p. cables (Sched. 1, 4 and 7).—Enfield Cable Works, Ltd.
E.h.p. and triplex aerial l.p. cables (Sched. 2, 3 and 5).—British Insulated Cables, Ltd.
E.h.p. ozone-proof cables (Sched. 6).—Callender's Cable and Construction Co., Ltd.
The Committee reports that 16 tenders were received, five from foreign manufacturers, four being incomplete. The one complete foreign tender showed the lowest prices, except for Schedule 5, but the Committee has not seen its way to advise its acceptance, considering that it would be in the best interests of the Council if the lowest British tenders were accepted.

METROPOLITAN WATER BOARD.—Accepted:—
3,000 yd. of cable in connection with electric lighting installation at new pumping station, Kempton Park (£288).—W. T. Glover & Co., Ltd.

Royal Mail Steam Packet Co. Accepted:—
Twelve months' supply of Mazda electric lamps.—British Thomson-Houston Co., Ltd.

**Mansfield.**—Town Council.
3,700 yd. h.p. cable.—Netherland Cable Works, Ltd.

**Manchester.**—Tramways Committee.
Fifty 50-h.p. tramway motors, 100 B.510-type tramway controllers.—British Thomson-Houston Co., Ltd.

**Paignton.**—Urban District Council. Accepted:—
Lighting band enclosure, laying cable.—Paignton Electric Light and Power Co., Ltd.
Wiring, lamps, &c.—E. M. Fawcett.

**Portsmouth.**—Electricity Committee. Recommended:—
Erection of two grit arrestors at power station (£1,564).—Babcock & Wilcox, Ltd.

**Preston.**—Electricity Committee. Accepted:—
Switchgear, &c. (£1,977).—Metropolitan-Vickers Electrical Co., Ltd.
Cables, &c. (£5,532).—British Insulated Cables, Ltd.

**Rochford (Essex).**—Board of Guardians. Accepted:—
Installing an up-to-date system of telephones, incorporating provision for fire alarms (£336).—E. Shipton & Co., Ltd.

**Ryde.**—Town Council. Accepted:—
Installing electric light in the pavilion (£221).—Charles Langdon.

**South Africa.**—CAPE TOWN.—Electricity Committee. Recommended:—
Cable (£10,535).—British Insulated Cables, Ltd.
Rolled steel joists (£195), 3 Copes automatic feed-water regulators (£144), circulating-water pump (Worthington-Simpson, Ltd.) (£983).—Davis & Soper, Ltd.

**Seaham Harbour.**—Housing Committee. Accepted:—
Electric wiring in 80 cottages on the Carr House estate.—Mr. H. Nicholson (in place of a withdrawn tender).

**Southend-on-Sea.**—Town Council. Accepted:—
Rotaries, switchgear, &c. (£20,343).—General Electric Co., Ltd.

**Stoke-on-Trent.**—Health Committee. Accepted:—
Electric wiring Shelton clinic.—Hawley & Ingram.

**Wakefield.**—Electricity Committee. Accepted:—
Repairs and additions to steel chimney at power station.—Hepburn Conveyor Co., Ltd.

**Yeovil.**—Town Council. Accepted:—
Installing electric lighting at the new municipal offices, public library, and museum (£552).—Aish & Co.
Installing electric lighting fittings in the Town Hall, anteroom, staircases, and magistrates' court (£184).—Western Counties Electrical and Engineering Co., Ltd.

# Forthcoming Events.

**Tramways and Light Railways Association.**—June 29th to July 1st. Bath. Annual Congress.

**Institution of Electrical Engineers.**—Thursday, July 7th. Natural History Museum, South Kensington, S.W. 8.30 to 11 p.m. Annual conversazione.

**British Electro-Farming Conference.**—Thursday, July 7th. Royal Agricultural Show, Newport, Mon. 12 noon. "Electric Power Supply in Rural Areas," Mr. J. W. Beauchamp; "Use of Electricity in Poultry and Dairy Work," Mr. R. Borlase Matthews.

# The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following:—

BRITISH domestic irons.
STA-WARM electric glue pot.
KODA primary cells.
APOLLO reflectors.
WOODPECKER fault finder.
Small diameter 230-volt lamps (screw cap) which are fitted with a small perfume cap on the top of the lamp.

# Notes.

### Electrical Association for Women.

The annual summer outing of the Glasgow and District Branch of the E.A.W. took place on June 20th, when a party of members visited Loch Katrine. The members left Glasgow in the morning by motor coaches and went to the Trossachs by way of Stirling and Callander. After lunch at the Trossachs Hotel, at the invitation of the Glasgow Corporation Water Department, the party was conveyed by steam and motor launches to the Royal Cottage. A cruise was then made to the head of Loch Katrine and to Stronachlacher, where the ladies visited the hydro-electric power plant which supplies the whole of the estate with electricity for lighting, heating, and cooking. After tea at the Bailie Nicol Jarvie Hotel, Aberfoyle, the party journeyed back to Glasgow *via* the picturesque Blane Valley.

### Ultra-Violet Light in the Brewery.

The fact that ultra-violet rays are being used experimentally on a large scale for the manufacture of beer was mentioned at the recent session of the British Pharmaceutical Conference at Brighton. Dr. G. S. Ellis (Hove) is reported to have said it had been found that the time required for fermentation was reduced by 25 per cent., fermentation took place at a lower temperature, the activity of the yeast was greater, the quality of the beer was much better, and it kept longer in good condition.

### Association of Mining Electrical Engineers.

Members of the North of England branch of the Association of Mining Electrical Engineers paid a visit on June 18th to the works of Messrs. A. Reyrolle & Co., Ltd., Hebburn. Acknowledging a vote of thanks, Mr. H. W. Clothier, managing director, declared that the conditions for working electricity in coal mines were more onerous and severe than anything they came across in the normal supply of utility services.

### A New D.C. Meter.

In the description of the Lawson meter under the above heading in our last issue, the bath unit of the meter was referred to as being the only moulded one on the market. The makers, Messrs. Fox & Offord, Ltd., have asked us to state that their claim is not concerned with the use of moulding material, but with the special design of the bath unit, and the fact that the design has been largely rendered practicable by the excellent results obtained by the use of composition mouldings.

### District Railway Accident.

Eight persons were injured on June 27th in a head-on collision between two electric trains on the District Railway, outside Wimbledon Station. The trains involved were from Wimbledon and from Earl's Court, and the latter train is stated to have jumped the points. Three carriages were telescoped. The lines were blocked, and the District Railway portion of Wimbledon Station was closed until the track was cleared. An inquiry is to be held.

### Fatality.

"Accidental death" was the verdict at an inquest at Rhymney on June 21st on Brinley Lloyd (26), an electrician, of Pengam, who died following injuries received at the Groes Faen Colliery, Deri. According to the *Western Mail*, Frederick Ball, head electrician at the Groes Faen Colliery, said that Lloyd was his chief assistant. An electric motor was being reinstalled on June 15th. Lloyd was left to switch in, having stated that everything was in order. The next thing he heard was a report. He saw flames coming from the sub-station, and they were plunged into darkness owing to the power being cut off. He found Lloyd on the ground with his clothes severely burned. After an inspection he concluded that violent sparking had set fire to an oil tank, causing an explosion. He thought the tank was not actually bolted tight. It was Lloyd's duty to see that the bolts were tight.

### Electricity on the Farm.

A conference on the use of electric power for the farm, land, and homestead, will be held in the members' tent in the show-yard at the Royal Agricultural Show, Newport, Mon., at 12 noon, on July 7th. Visitors are cordially invited to attend and take part in the discussion which will be opened by Mr. J. W. Beauchamp, M.I.E.E., on "Electric Power Supply in Rural Areas," and by Mr. R. Borlase Matthews, Wh.Ex., M.I.E.E., A.M.Inst.C.E., on the "Use of Electricity in Poultry and Dairy Work." The chair will be taken by Mr. S. Edwards, chairman of the Monmouthshire County Branch of the National Farmers' Union, and there will be a working exhibit arranged by the British Electrical Development Association.

An interesting experimental scheme was launched by the South Wales Electrical Power Distribution Co. on June 23rd, when a demonstration of artificial hay drying was commenced in fields adjoining the Upper Boat generating station. It is the object of the Power Company to let farmers in the district see for themselves what can be done in connection with artificial drying, and it is suggested that if the results are favourable it may be worth while purchasing the necessary plant, probably on the co-operative principle, to hire out to the local farmers. The demonstrating plant has been borrowed from Messrs. Sugar Beet & Crop Driers, Ltd. Low-grade fuel oil is burned in a tube furnace over which a fan draws air and delivers it, heated to 180 deg. F., to the centre of the hay stack by means of a specially constructed structure. The cold-air method was also to be demonstrated before the end of the experiment. In this method, devised by the late Mr. W. W. Hood, the wet hay is stacked and the temperature allowed to rise to a maximum of 158 deg. F., a safe fermentation temperature, and cold air is then blown into the stack till the temperature is reduced to a low temperature.

### Short-Circuit Fuse Tests.

Following a luncheon given by Messrs. Parmiter, Hope and Sugden, Ltd., at the Trocadero Restaurant, London, on June 28th, to a number of electrical engineers, the firm, by the courtesy of the St. James's and Pall Mall Electric Light Co., Ltd., held a demonstration at the Supply Co.'s Marshall Street sub-station, when a variety of fuses were subjected to a short-circuit loading of 3,540 A at 450 V. The fuses under test included copper, tin, aluminium, and zinc wire in air, copper and tin wire in china fuse-holders, and an ordinary cartridge fuse, in addition to the Aeroflex light-duty fuse, the Aeroflex traction fuse, and the firm's latest development, the Fluvent-Aeroflex fuse. The tests showed clearly the superiority of the Aeroflex fuse over the older types. Unfortunately, the second test on the Fluvent-Aeroflex fuse was a failure owing to a defect in the assembly of the fuse. The screw securing one of the fuse contacts to the porcelain holder had been left long enough to make contact, or almost, with the other contact, with the result of a "dead-short" across the contacts and consequent earthing to the case. The Fluvent-Aeroflex fuse is a specially-designed "Aeroflex" which is adaptable to the Fluvent cases.

### The A.S.L.I.B. Directory.

Mr. G. F. Barwick, general editor, wishes to thank all those who have responded to his request for information in connection with the preparation of the "Directory of Sources of Specialised Information," and at the same time begs those who could assist, but have not yet written to him, to do so at once (Association of Special Libraries and Information Bureaux, 38, Bloomsbury Square, London, W.C.1) as the organisation is fast approaching the close of its work. He would especially like to be able to include some more collections in the possession of private individuals.

### Injuries Caused by Lightning.

During a storm on June 26th, eight persons who were sheltering under a tall elm near Forster Memorial Park, Catford, were struck by lightning. They were conveyed to Lewisham Hospital, two of them being in a serious condition.

### Presentation of the "W.O.B." Prize.

On Monday last Miss Edna Gardiner, the winner of the first prize in the ballot organised in connection with the "W.O.B." Campaign, received a cheque for £2,000. The presentation was made by the Lord Mayor of Bristol.

The Lord Mayor was supported by Mr. F. W. Prosser, of the Corporation Electricity Department, Messrs. C. W. Sully, J. W. Beauchamp, V. W. Dale, and J. W. Spark, and a large number of representatives of manufacturers and contractors in the South-Western area. In presenting the cheque, the Lord Mayor spoke of the undoubted help which the campaign had given to the development of electricity in the home. He then handed vouchers for £25 (5th prize) to Mrs. M. Gardiner (mother of the first prize winner) and for £2 10s. (20th prize) to Miss I. W. Trace. After the ceremony, a luncheon was held at the Grand Hotel; the toast list included "The E.D.A. and E.L.M.A." and "The Bristol Electric Circle."

### Appointments Vacant.

Electrical machinery engineer (£400), for hydro-electric development on the Shannon; assistant mechanical and electrical engineers (£377), for the Works and Buildings Department, Air Ministry; telegraph foremen (£400), for the Government of Nigeria; senior lecturer in the Electrical Engineering Department at Loughborough College; clerk of works, for the Armagh Urban District Council; fitter-driver, for the Watford Corporation electricity department. (See our advertisement pages to-day.)

### Aids to the Deaf.

We have received from Mr. J. L. Calvard, A.M.Inst.C.E., an interesting communication with regard to the article on "Electrical Aids for the Deaf," by Mr. C. M. R. Balbi, which appeared in our issue of May 20th. Mr. Calvard has been working on similar lines to Mr. Balbi, and about a year ago he published a series of articles in the *Hull Evening News* on "The Ear and Hearing," in the course of which he described the results of experiments carried out with amplifying apparatus which had proved very successful. The outcome was the preparation of a set of instructions and diagrams, with the aid of which, it is claimed, any wireless amateur who has assembled his own wireless set can construct a receiver and transmitter suitable for use by a deaf person, for conversation, &c., in an ordinary room, or by several persons simultaneously, with headphones. The details of construction, the components, and the mode of operation are fully set forth; standard wireless components are employed, including two dull-emitter valves, a transformer, and a modulator. The instructions are issued with a booklet containing a reprint of the articles, in an envelope which can be obtained from "Aural Envelopes," 1, Ferens Avenue, Newland, Hull, price 2s. 6d. (inland postage 3d. extra); the booklet alone can be had, price 6d., postage 1½d., and a separate set of instructions is available for the construction and use of an instrument to serve the double function of aiding the deaf to hear local sounds, and of receiving broadcast speech and music. The apparatus are not manufactured for sale. Any profits that result from the sale of the literature are to be divided between named charitable institutions, no financial benefit accruing to Mr. Calvard, whose interest is purely philanthropic.

### Late Legal.

BURNDEPT WIRELESS, LTD.—In the Chancery Division, on June 28th, an application was made to Mr. Justice Eve for the appointment of a receiver of the assets of Burndept Wireless, Ltd. The application was made on behalf of Messrs. Coutts & Co., Ltd., holders of a charge of £38,000. Support was given by the second debenture holders, for £50,000. Mr. Andrewes-Uthwatt said that the directors had decided that the position of the company's finances made it impossible to continue the business. The company did not oppose the application, and an order was accordingly made.

MARCONI'S WIRELESS TELEGRAPH CO., LTD.—The petition for the confirmation of this company's reduction of capital again came before Mr. Justice Eve on June 28th. Mr. Wilfred Greene, K.C., for the company, asked that the date of hearing should be fixed for July 21st, as Senatore Marconi had not had time to go through the evidence put in in opposition to the reduction. Sir Albion Richardson, who appeared for opposing shareholders, said that his clients had appointed a committee of four to represent their interests. The date of hearing was fixed for July 21st.

### Extensions at Fulham Electricity Works.

Over 18 months ago considerable extensions were carried out at the electricity works of the Metropolitan Borough of Fulham, involving the construction and equipment of a complete generating station with a capacity of 12,000 kW, made up of two 6,000-kW turbo-alternators fed with steam by three 40,000-lb. boilers. This important contract, which covered also very complicated alterations and additions to the condensing-water circulating system, was secured in the face of severe competition, including several tempting offers from abroad, by Messrs. Vickers, Ltd. A report was recently presented to the Council by its Electricity Committee on the results of the 18 months' successful working of the new generating plant, recommending that the Council place on record its high appreciation of the manner in which Messrs. Vickers, Ltd., had carried out their contract, and of the valuable services rendered by the borough electrical engineer (Mr. A. J. Fuller) and his staff in connection with the contract.

Mr. Fuller's report stated that, owing to increase in the load, it was absolutely necessary that one of the sets should be running within six months, and although this appeared almost impossible, by pressure in all the departments of Messrs. Vickers's works, it was accomplished in spite of a very lengthy builders' strike. The construction, delivery, and erection formed a record. The results had been very satisfactory indeed, and there had been very few difficulties or alterations such as were usually necessary on a contract of this size. Since the new plant started work, they had not had to take a single portion of the machinery off load due to breakdown. The turbines had proved excellent running machines, and according to the tests made in March, 1926, the machines easily came within the guaranteed consumptions; these were at 5/4 load 10.48 lb. steam; at 4/4, 10.22; at 3/4, 10.48; and at 2/4, 11.00 lb., whilst the actual test figures were respectively 10.17, 10.10, 10.18, and 10.36 lb. The three boilers had proved well up to their requirements; the efficiency arranged for was 85 per cent., and the results of the test proved that this figure was attained. They had been able to carry an average efficiency of about 80 per cent., which, when the varying load was taken into account, was an extremely good result.

### Power from the Tides.

A meeting of the 70 subscribers to the Exe Power Experiment Fund was held at Exmouth on June 22nd, when the scheme was further explained by its originator, Mr. E. L. Fleming, who stated that an experiment was to be tried at the pier to obtain data regarding the utilisation of the power of the tides flowing in and out for commercial purposes and for generating electricity. Two of the finest sites that could be obtained had been selected, where the tides ran very strongly, both at ebb and flow. He had visited the Board of Trade offices and ascertained that the Board would be willing to consider an application for permission to moor vessels in these two positions in the river. Mr. Fleming said that he had been in touch with three engineering firms and had received an offer to supply a propeller for the generation of electricity which would be turned by the tide. It would drive a vertical shaft, on the top of which would be placed a flanged pulley, around which would run a belt to drive the dynamo. The apparatus would be placed between two concrete columns and two wooden piles at about the centre of the pier, where the tide ran strongly. The cost of the experiment would be about £65.

### An Electrical Installation at the Zoo.

A further example of the adaptability of electricity is to be found in connection with the new installation at the reptile house at the London Zoo. The problems involved in drawing up an electrical heating scheme for the building were of an unusually intricate character. The cardinal purpose of the installation is to reproduce as nearly as possible the conditions prevailing in the tropics. The adoption of electrical heating was decided on by the Zoo authorities as essential for the maximum health and comfort of the rare occupants of the house. The new building is a rectangular structure with a central island encircled by a wide corridor, the dens and cages flanking each side of this. Some idea of the wiring work involved may be gathered from the fact that in the case of the smaller cages there are over 28 electrical connections, while in the larger dens there are as many as 162; the crocodile and alligator pools called for approximately 200 connections. The temperature has to be maintained at all times at about 80 deg. F. Should it rise to 85 deg., the keepers' attention would be drawn to the fact by the ringing of a bell and the lighting of a small red lamp on a special indicator board; similarly a green lamp would indicate a fall of temperature to 75 deg. F. This indication would only take place in an emergency, as each appliance in the cages has its own independent thermostatic control within temperature limits of 77 and 83 deg. F. The requirements called for special designs of heaters, which entailed much research by the makers, the General Electric Co., Ltd. A flat type of heater is used to heat the concrete floors of the cages; each appliance provides sufficient heat to penetrate effectively over a wide area through the floor—thick and strong enough to bear the weight of a man walking upon it. These heaters are placed towards the front or public-view side of the cage, so that the exhibits will most of the time frequent this part of their quarters. A tubular type of heater is used for the walls and also for various parts of the rocks, ponds, and so on. Specially-designed radiant heaters are affixed near the roofs of the cages, which not only help to maintain the requisite temperature, but also have the effect of preventing steaming or condensation upon the windows. These heaters, whether installed as a battery, as in the case of the crocodile den, or in single units, are so positioned as to be entirely out of the view of the public. They are all automatically controlled. The lighting of the cages also received much consideration. The lamps are so arranged that an effect is produced resembling tropical sunshine, and the reflectors are so placed that the light will attract and induce the cage inmates to spend most of their time in view of the public. The lamps are completely concealed from view in the same way as the sources of radiant heat. The lighting in the corridors is carefully co-ordinated in the general arrangements, the pendants for semi-indirect lighting giving an ornamental touch as well as fulfilling their primary purpose with high efficiency. The controlling switchgear is installed in the basement of the house, thereby permitting the convenient local supervision necessary. Something like 20 miles of cable has been used on the installation.

### B.E.S.A. Publication.

A British standard specification, No. 148-1927, for insulating oils for electrical purposes (excluding cables), has recently been issued by the British Engineering Standards Association. This specification is a revision of No. 148-1923, which was a tentative one for oils for use in transformers, oil switches, and circuit-breakers. The classification of the oils in the new specification, as in the old one, is based on the sludging properties of the oils, but class C oil has been eliminated. Each class of oil is further sub-divided, for classification purposes, into three grades, these grades being based on the "cold test" of the oils. The oils are no longer graded according to their viscosity, only one viscosity limit being given in the new specification for all classes. Class A oils, non-sludging, are specified for use in transformers in which the working temperature of the oil exceeds 80 deg. C., in oil-switches in which the working temperature exceeds 70 deg. C., and in all oil-switches of over 500-A capacity which have their main contacts under oil and are operated for long periods at near their rated loadings or in hot situations. Class B oils are suitable for use in transformers in which the working temperature of the oil does not usually exceed 75 deg. C. The three grades in each class, A and B, are 0, 10 and 30. For grades A.0, A.10 and A.30 the maximum sludge is 0.1 per cent., and for B.0, B.10 and B.30 it is 0.8 per cent. The specified viscosity for both classes of oil at 15.5 deg. C. is 200 sec. (Redwood); the minimum specified electric strength in each case is 30,000 V; the minimum flash point, 145 deg. C.; and the maximum evaporation, 1.6 per cent. The methods of carrying out the various tests called for by the specification are fully described in the appendices, the test for determining the sludge value of the oil having received special attention. Since the issue of the 1923 specification a considerable amount of research work has been carried out in connection with the tests on oils, and the experience gained in this work is reflected in the new publication. The preparation of the revised specification has been undertaken with full knowledge of the progress of the deliberations of the International Electrotechnical Commission, which is carrying out extensive tests with the view to the ultimate preparation of an international specification for tests on insulating oils. Copies of the new specification may be obtained from the Publications Department, British Engineering Standards Association, 28, Victoria Street, London, S.W.1, price 2s. 2d., post free.

### Educational.

MANCHESTER MUNICIPAL COLLEGE OF TECHNOLOGY.—Particulars of the courses leading to the Manchester University degrees in the Faculty of Technology in the following departments: Mechanical, Electrical, and Municipal and Sanitary Engineering, Chemical and Textile Technology and Industrial Administration, can be obtained free on application to the Registrar, College of Technology, Manchester. (See our advertisement pages to-day.)

### Electricity v. Gas.

The *Western Mail* reports that keen competition is being displayed between the Cardiff Gas Company and the Corporation's electricity undertaking as to which form of lighting shall be installed at the Cardiff Corporation workmen's housing estates. The city treasurer, Mr. John Allcock, had been asked by the Gas Company to sign documents authorising it to install gas fittings for lighting purposes in about twenty of the Corporation houses, which have already been equipped for electric lighting by the Electricity Committee of the Corporation. Mr. C. Hoare, at a meeting of the Electricity Committee on June 21st, said they ought to curtail the Gas Company's activities. Gas lighting was not necessary in houses already electrically fitted, he contended. This was the general view of the committee, and on the motion of Mr. William Williams it was unanimously agreed to instruct the city treasurer not to sign any authority to allow the Gas Company to install gas fittings for lighting purposes.

# Institution Notes.

### Institution of Electrical Engineers.

LONDON STUDENTS' SECTION.—*Summer Tour*, 1927.—The annual summer meeting of the Students' Sections will be held this year in the Midlands and the North of England. The majority of the party will leave London on Saturday afternoon, August 13th, for Rugby, where a few days will be spent, and from there will go to Manchester and Liverpool, returning to London on August 21st. An attractive programme has been arranged, including an all-day motor trip from Matlock to Manchester, and permission has been given to visit the following works:—British Thomson-Houston Co., Ltd., Metropolitan-Vickers Electrical Co., Ltd., Ford Motor Co., British Insulated Cables, Ltd., the Rugby radio station, and Barton power station. The total cost of the tour (for those travelling from London and back to London) should not exceed £10 per head, which charge may be reduced if sufficient members take part in the tour.

### The Society of Engineers (Inc.).

We learn that, owing to the generosity of a member of the above Society, three special yearly premiums of ten guineas each have been provided for the best papers submitted by the members, associate members, and associates respectively of the Society for three years. In each class the first premium will be awarded for the best paper submitted before November 30th, 1927. It is stipulated that the competitors shall not be required to read their papers in public unless they elect to do so. Practically speaking, the Council would accept papers on any reasonable engineering subject, but the competitors should submit the titles of their papers to the Society before starting to write the papers.

# Our Personal Column.

**Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements**

On Friday last in the board room of the ELECTRICAL REVIEW, Ltd., at 4, Ludgate Hill, London, the directors of the company made a presentation of a silver cigar box to Mr. OSBORNE PEARSTON, A.M.I.E.E., as an expression of their appreciation of his services rendered on the advertising side of the ELECTRICAL REVIEW during 34 years, on the occasion of his retirement. Mr. Henry Alabaster (the chairman of the company) was absent from town and was unable to make the presentation in person. Mr. Geoffrey Alabaster, at the request of his father, read the speech which he would have delivered. Mr. H. Alabaster said that having had a great deal to do with Mr. Pearston throughout his long association with the business he recognised that the severance of a link that had held for 34 years was not an event of small moment. The directors had noted the pain and difficulty with which he had struggled against the handicap of ill-health, but had hoped that time would bring relief. It was still their profound hope that good health would return with the relief from the stress and anxiety of business. Mr. Alabaster said that he would not attempt to go in detail over the many varied experiences through which Mr. Pearston and the REVIEW had passed during these 34 years, tempting as reflection might be. He would conclude by asking Mr. Pearston's acceptance of a silver cigar box as a token of the appreciation already expressed, and wish him the great boon of a substantial recovery of health and strength which they hoped he would enjoy for many years to come. Mr. Pearston, in thanking the board for their gift, said how keenly he felt the fact that the state of his health compelled him after so lengthy a period with the REVIEW to leave his accustomed duties. In reminiscent mood he recalled episodes in his close association with so many friends in the electrical profession and industry, and reviewed some of the work and other interests that had so long occupied him. He was hopeful that after a rest, if his health were re-established, he would be able to take up some other kind of activity in connection with the industry. The staff of the editorial, advertising, accountancy, publishing, engraving and composing departments presented Mr. Pearston with a combined spirit and smoker's cabinet. Mr. Pearston relinquished his position as from yesterday, June 30th. His private address is 456, Seven Sisters Road, N.15.

The duties that have been performed by Mr. Pearston in recent years will be continued by Mr. H. J. Porter-Cox, who has been actively engaged on the advertisement staff of the ELECTRICAL REVIEW since the year 1907, and is well known to all electrical and allied manufacturing and trading companies and firms in the provinces as well as in London.

Mr. RONALD A. FEARNLEY, Corporation tramway manager at Keighley, was married to Miss DOROTHY VICKERS at Sheffield on June 27th. The presents included a barometer from the tramway staff and employés. The bridegroom is the elder son of Mr. A. R. Fearnley, tramway manager at Sheffield.

Mr. JAMES DALRYMPLE arrived in England last week on his return from his South American visit.

Lieut.-Colonel ADRIAN SIMPSON, C.M.G., resigned from his position as deputy managing director of Marconi's Wireless Telegraph Co., Ltd., in April last, and at the same time severed his connection with that company's various associated and subsidiary undertakings.

At a meeting of Glasgow Corporation Electricity Sub-Committee on Works it was moved that applications for the post of chief technical assistant be advertised. An amendment that Mr. ALEXANDER P. MCKIM, laboratory assistant in the electricity department (age 37½ years, service 13 years), be appointed to fill the vacancy, was carried on a vote.

The accompanying photograph is of Mr. and Mrs. S. DICKSON MOYSE, who were married at St. George's, Hanover Square, W., on June 22nd. Mrs. Moyse was Miss Kathleen Railing, daughter of Mr. M. J. Railing, a director and general manager of the General Electric Co., Ltd. There were nearly 400 guests present at the reception held at Claridge's.

*Topical Press.*] [*London.*

**Mr. and Mrs. S. Dickson Moyse.**

Mr. W. C. MCCALLUM, of the English Electric Co.'s Contract Department, is severing his connection with that company and is taking up a new position with the Yorkshire Electric Power Company, with headquarters in Leeds. Mr. McCallum was for a number of years in the employ of Messrs. Dick, Kerr and Co., Ltd., both in Preston and Japan.

*The Times* records that Mr. G. A. JULIUS, chairman of the Australian Commonwealth Council of Scientific and Industrial Research, arrived in London on June 21st, and adds that he is visiting England primarily to effect a closer *liaison* between the Commonwealth Council and the various scientific departments of the British Government.

Mr. L. STUART-JONES, the Deputy Controller of the Central Telegraph Office (G.P.O.) has been appointed Controller to follow Mr. JOHN LEE, who has just retired.

Bromley (Kent) Town Council has appointed Mr. S. J. C. ELLIS as assistant engineer at the Electricity Works for a year as from April 1st last.

Mr. J. MCLELLAN, A.M.I.E.E., has resigned his position as London manager to the Traction Equipment Co., Ltd., and will develop agency work from London. He was a sales manager with Simplex Conduits, Ltd., for many years.

Mr. S. R. WRIGHT, manager of the Radio Department of Christopher Pratt & Sons, Ltd., of Bradford, was specially commissioned by the Radio Research Board (Department of Scientific and Industrial Research) to conduct experiments at Giggleswick (the temporary headquarters of the Astronomer Royal and party) in connection with the effects of the total eclipse of the sun on radio reception.

The members of the Engineers' Committee of the South-East Lancashire Electricity Advisory Board recently entertained to luncheon Mr. W. J. H. WOOD, their chairman (who has been appointed engineer-in-chief to the County of London Electric Supply Co., Ltd.), and Mr. S. J. WATSON, their vice-chairman (who has become chief engineer to the London and Home Counties Joint Electricity Authority). Mr. C. D. Taite (Lancashire Electric Power Co.) presided, and in proposing the health of the guests, said that the occasion was probably without parallel, and, by a coincidence, in that very room they had bidden farewell to Dr. S. L. Pearce, who preceded Mr. Wood as chairman. He wished Messrs. Wood and Watson success and happiness in their new positions, and asked them each to accept a gold pencil as a memento of their association with the Committee. Every member present (including the clerk, Mr. A. H. Banks) added his testimony to Mr. Taite's. Mr. Wood hoped that although

his official connection with the Committee was ending he would be able to continue his friendly relations with the members. In his reply, Mr. Watson mentioned that two past engineers of Salford were there (Messrs. Taite and Robertson), the present engineer (himself), and the engineer-elect (Mr. Romero). The proceedings terminated with a vote of thanks to Mr. Taite.

**Obituary.**—MR. STUART A. RUSSELL.—We regret to record that Mr. Stuart A. Russell passed away at his residence at Kensington on June 26th.

MR. H. JENNINGS.—The death has taken place, at the age of 66 years, of Mr. Herbert Jennings, head of the firm of H. Jennings & Son, electrical engineers, of Bromsgrove.

MR. E. W. MARSH.—The death occurred on June 16th of Mr. E. W. Marsh, electrician, of Hilderthorpe Road, Bridlington. He had been in business in the town for 55 years.

**Wills.**—The late Mr. A. H. P. STONEHAM, chairman of the Kalgoorlie Electric Tramways, Ltd., left £70,837 gross and £70,329 net personalty.

MR. THOMAS C. S. RATCLIFF, chairman of Charles Clifford and Son, Ltd., Birmingham, left £24,486 gross and £20,918 net personalty.

# Financial Section.

**New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.**

## New Companies Registered.

**Ellis & Mort, Ltd.**—Private company. Registered June 20th. Capital, £12,000 in £1 shares. Objects:—To acquire the business of J. A. Mort, trading as "Ellis & Mort" at 48 and 50, Topping Street, Blackpool, and to carry on the business of electricians, electrical and mechanical engineers, manufacturers of, and dealers in electrical, magnetic, telegraphic, telephonic, and other appliances, manufacturers of, and dealers in wireless telegraph and telephone instruments, &c. The first directors are:—J. A. Mort (permanent and managing director), 50, Topping Street, Blackpool; G. P. Fearnside, 55, Leamington Road, Blackpool. Qualification, 100 shares. Solicitors: Jacob Parkinson & Co., 17, Birley Street, Blackpool.

**Electric Advertising Clip Co., Ltd.**—Private company. Registered June 23rd. Capital, £500 in £1 shares. Objects: To acquire from T. H. Bolam and D. L. Jones all their respective interests in (1) the copyright of six registered designs for a combined frame for an advertisement picture, coloured sheet, or the like, and clip for use in attaching it to an electric lamp bulb, (2) two British provisional protections for improved clip or carrier for an electric lamp bulb, (3) a British provisional protector for a clip and frame for application to an electric lamp bulb, and (4) any form of protection for apparatus for condensing or intensifying light, &c. The permanent directors are:—T. H. Bolam, 81, Uxbridge Road, Ealing, W., dentist; D. L. Jones, 81, Uxbridge Road, Ealing, W., merchant. Remuneration of permanent directors, £500 each per annum. Registered office: 173, Uxbridge Road, Ealing, W.

**Peterhead Electricity Co., Ltd.**—Registered June 24th. Capital, £5,000 in £1 shares. Objects: To carry on the business indicated by the title. Minimum cash subscription 500 shares. The first directors are:—K. A. S. Moncrieff, M.I.E.E., The Clough, Oxted, Surrey; E. H. F. Reeves, Field House, Friern Park, North Finchley; J. Eustace, Elmhurst, London Road, Chelmsford; J. A. N. Houblon, Boxford, Newbury, Berks.; Lt.-Col. G. C. Stowell, Glendale, Church Road, Hanwell, Middlesex. Qualification, £100 shares. Registered office: 424, Salisbury House, London Wall, E.C.2.

**Birmingham Electric Furnaces, Ltd.**—Private company. Registered June 20th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electric furnaces for annealing and heat treatment and kindred purposes, &c. The subscribers (each with one share) are:—W. H. Wiggin, Wiggin Street Works, Birmingham, manufacturer; G. J. Withington, The Gables, Francis Road, Stechford, Birmingham, accountant. Solicitors: Pinsent & Co., 6, Bennetts Hill, Birmingham.

**W. A. C. Smith, Ltd.**—Private company. Registered in Edinburgh, June 20th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of, agents for, and dealers in wireless, telegraphic or telephonic accessories, &c. The directors are:—W. Harper, 23, Roxburgh Circus, Cardonald, Glasgow, engineer; P. F. Cunningham, c/o McFadden, 114, Bothwell Street, Glasgow, engineer. Registered office: 93, Holme Street, Glasgow, C.2.

**Courtin & Walsh, Ltd.**—Private company. Registered June 22nd. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical, gas, water, heating or lighting apparatus, fittings, and accessories, including electro-medical apparatus and fittings, wireless appliances, &c. The first directors are:—M. J. Bowes (chairman), Montrose, Grosvenor Road, Orpington, Kent; F. F. Evans, Lyndhurst Cottage, Ryders Avenue, Walton-on-Thames; R. F. V. Walsh, 58, Meadvale Road, East Croydon, Surrey; L. Courtin, 67, Beecroft Gardens, Wembley Park. Qualification, £5 shares. Solicitors: Donald McMillan and Mott, 14, King William Street, E.C.4. Registered office: 13, Westmoreland Place, City Road, E.C.

## Official Returns of Electrical Companies.

**Underwood (Manchester), Ltd.**—Satisfaction to the extent of £1,900 on May 27th, 1927, of debentures dated April 28th, 1927, securing £7,400.

Particulars filed of £5,000 second debentures authorised May 27th, 1927, charged on the company's undertaking and property, present and future, including uncalled capital (subject to £7,400 "A" debentures), the whole amount being now issued.

**British Columbia Electric Railway Co., Ltd.**—Capital, £5,320,000 in £1,440,000 5 per cent. cum. perpetual preference stock, £1,440,000 preferred ordinary stock, £1,440,000 deferred ordinary stock, and 1,000,000 unissued shares of £1 each. Return dated December 30th, 1926 (filed March 18th, 1927). £4,320,000 stock shares taken up and fully paid. Mortgages and charges, £3,849,470.

**Petersfield Electric Light and Power Co., Ltd.**—Capital, £20,000 in 6,500 preference and 13,500 ordinary shares of £1 each. Return dated December 23rd, 1926. 8,919 ordinary and 3,885 preference shares taken up. £12,804 paid. Mortgages and charges, £6,000. Return of allotments, made up to February, 1927, shows a further 33 preference and 167 ordinary shares allotted for cash.

**Thames Electric Wireless Co., Ltd.**—H. C. Mundy, of 93-94, Chancery Lane, W.C.2, ceased to act as receiver and manager on June 8th, 1927.

**United Kingdom Manufacturing Co., Ltd.**—Particulars filed of £1,000 debentures authorised June 1st, 1927, charged on the company's assets, including uncalled capital (if any) and goodwill, the amount of the present issue being £400.

**Liskeard Gas and Electricity Co., Ltd.**—Issue on June 3rd, 1927, of £3,600 debentures, part of a series already registered.

**N. K. (Bradford), Ltd.**—Debenture, charged on the company's freehold, leasehold, and other property, undertaking, present and future, including uncalled capital, dated June 15th, 1927, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd.

**Schall & Son, Ltd.**—Charge on building agreement in respect of land and premises at Bulstrode Mews and Cross Keys Mews, W., dated June 8th, 1927, to secure all moneys due or to become due from the company to the Midland Bank, Ltd.

**General Radio Co., Ltd.**—Satisfaction in full on June 3rd, 1927, of debentures dated October 3rd, October 24th, and November 27th, 1923, securing £6,000.

Issue on June 13th, 1927, of £5,000 debentures, part of a series already registered.

**Dulverton Electric Lighting Co., Ltd.**—Debenture dated June 8th, 1927, to secure £1,000 charged on the company's assets, present and future, ranking *pari passu* with £2,000 debentures already issued. Holders: Branch Nominees, Ltd.

**Northern General Transport Co., Ltd.**—Mortgage on Hills Mill, Nevill House, and other premises at Durham, dated June 2nd, 1927, to secure £9,000. Holders: Alliance Assurance Co., Ltd., 1, Bartholomew Lane, E.C.

**J. P. Hall & Co., Ltd.**—Satisfaction in full on June 16th, 1927, of debentures dated March 30th, 1926, securing £46,666 13s. 4d.

**Adams Bros. (Longton, 1925), Ltd.**—R. E. Clark, of 17, Albion Street, Hanley, Staffs., ceased to act as receiver or manager on June 13th, 1927.

**W. G. Pearson & Sons, Ltd.**—Capital, £6,000 in £1 shares. Return dated March 21st, 1927. All shares taken up. £6,000 considered as paid. Mortgages and charges, nil.

**Gibrico Electric, Ltd.**—Capital, £1,000 in £1 shares. Return dated March 25th, 1926 (filed March 24th, 1927). 600 shares taken up. £400 paid. £200 considered as paid. Mortgages and charges, nil.

**West Witton Electric Supply Co., Ltd.**—Capital, £1,000 in £1 shares. Return dated March 5th, 1927. 835 shares taken up. £835 paid. Mortgages and charges, nil.

**Playford & Son, Ltd.**—Capital, £500 in £1 shares. Return dated March 22nd, 1927. All shares taken up. £500 paid. Mortgages and charges, nil.

**Callington and District Electric Supply Co., Ltd.**—Capital, £5,000 in £1 shares. Return dated April 1st, 1927. All shares taken up. £5,000 paid. Mortgages and charges at date of return (£750 debentures issued April 27th, 1927), £250 debentures.

**Romford Electrical Radio, Ltd.**—Capital, £1,000 in £1 shares. Return dated June 1st, 1926 (filed April 9th, 1927). 50 shares taken up. £50 paid. Mortgages and charges, £400.

**Thanet Electric Factors, Ltd.**—Capital, £500 in £1 shares. Return dated June 29th, 1926 (filed March 23rd, 1927). 375 shares taken up. £251 paid. £124 considered as paid. Mortgages and charges, nil.

**Lilleker Brothers, Ltd.**—Capital, £3,000 in £1 shares. Return dated April 2nd, 1927. 1,525 shares taken up. £225 paid. £1,300 considered as paid. Mortgages and charges, nil.

**Coventry Electrical Accessories, Ltd.**—Capital, £5,000 in £1 shares. Return dated September 1st, 1926 (filed March 17th, 1927). 3,637 shares taken up. £3,637 paid. Mortgages and charges, nil.

**Power Contracts, Ltd.**—Capital, £10,000 in £1 shares. Return dated April 4th, 1927. 9,820 shares taken up. £7,300 paid. £2,520 considered as paid. Mortgages and charges, nil.

**City Wireless Co., Ltd.**—Capital, £100 in £1 shares. Return dated July 2nd, 1926 (filed March 21st, 1927). 52 shares taken up. £52 paid. Mortgages and charges at date of return, £500 (since paid off); since registered, debenture dated October 13th, 1926, to secure £500.

**Radio Experimental Co., Ltd.**—Capital, £1,000 in £1 shares. Return dated June 21st, 1926 (filed March 25th, 1927). 801 shares taken up. £333 paid. £468 considered as paid. Mortgages and charges, nil.

# City Notes.

### Hastings and District Electric Tramways Co., Ltd.

Dr. G. T. Moody (chairman) presided at the annual meeting on June 20th, and in his speech referred to the recent death of Mr. J. C. Williamson, a director of the company since its inception. Dealing with the report, Dr. Moody said that the industrial upheaval of the past year had had a serious effect upon the results. The revenue diminished while costs increased. They had established a good business but, he regretted to say, an unprofitable one owing to the low fares. From the over-provision for income tax in previous years they were able to pay the full preference dividend, but again no dividend could be paid on the ordinary shares. In September last the directors secured the agreement of a committee of the Hastings Corporation to the substitution of railless traction for the existing system. Steps were accordingly taken to promote the necessary Bill. To the board's surprise, the Council refused to ratify its Committee's agreement, and passed a resolution providing for opposition to the company's Bill. The action of the Corporation, besides being a breach of faith, was opposed to the views of its own expert, who had recommended the change of systems. In spite of opposition, however, the Bill had passed the House of Lords, and they anticipated that the same arguments would appeal with equal strength to the House of Commons. Since the passing of the Bill by the House of Lords, the Corporation had made an offer for the purchase of the undertaking, which amounted to a proposal to confiscate the property. The offer was subsequently increased, but it would not have provided a penny for the shareholders, and would not have sufficed to pay the debenture stockholders in full. In conclusion, he said that the Corporation's attitude to the company was in marked contrast to that of the Bexhill Corporation, from which they had received the utmost consideration.

### Hart Accumulator Co., Ltd.

The accounts for the past year show a net profit of £34,939 (as compared with £54,471). With £25,439 brought forward, the amount available is £60,378. A final dividend of 10 per cent. is recommended, making 15 per cent. for the year as for 1925. The allocation to reserve is reduced from £30,000 to £10,000, and £25,701 is carried forward. The meeting was to be held on Wednesday last.

### St. James' and Pall Mall Electric Light Co., Ltd.

Interim dividends of 8.4d. per preference share and 6d. per ordinary share have been declared.

### China and Japan Telephone and Electric Co., Ltd.

The report for 1926 shows a net profit of £7,331 (as against £18,640). The balance brought forward was £4,874, making £12,205. The directors recommend a dividend of 15 per cent., free of tax. In the preceding year, in addition to a dividend of 20 per cent., a 10 per cent. bonus was distributed.

### Anchor Cable Co., Ltd.

The net profit for the past year was £43,391, as against £69,191 in the preceding year. The addition of £76,197 brought forward makes available £119,588. It is proposed to pay a final dividend of 5 per cent., making 10 per cent. for the year (as compared with 20 per cent. for 1925), but a distribution of bonus shares (200 per cent.) was made during the year. £4,500 is put to taxation reserve and £95,588 is carried forward.

### Ruston & Hornsby, Ltd.

Speaking at the annual meeting on June 20th, the chairman (Mr. J. S. Ruston) said that the diminution of profit due to the industrial troubles of last year led the directors to decide not to recommend a dividend on the ordinary shares. He estimated that the extra cost of fuel and power at the Lincoln works alone was £650 per week, and the total was probably not less than £80,000, equal to 4 per cent. on the ordinary shares. The Imperial and local taxation was heavy, and was equivalent to a dividend of 3 per cent. on the ordinary capital. Increased railway rates meant an additional burden of not less than £20,000 annually, equal to a further 1 per cent. on the ordinary capital. Mr. Ruston concluded by saying that the company's capital was intact, and when the demand for their goods equalled production their new designs and methods would surely bear fruit.

### General Electric Co., Ltd.

The report for the year ended March 31st last shows a net profit of £1,030,853, as compared with £1,076,809 in 1925-26. The addition of £310,624 brought forward makes available £1,341,477. After providing for debenture interest, depreciation, preference dividends, &c., and transferring £140,000 to reserve, there remains a balance of £503,006. From this a dividend of 7½ per cent. on the ordinary shares is recommended (as last year), leaving £333,982 to be carried forward. Having regard to the adverse conditions, the result is considered satisfactory. As normal industrial conditions have not yet been restored, the directors deem it prudent to continue a conservative dividend policy. The company's works have been fully employed, although, during the dispute, at a higher cost and reduced efficiency. In heavy engineering, the volume of orders has been maintained at a satisfactory level, but the prices obtained, especially abroad, continue unattractive. The home demand for general electrical commodities has been below normal, the lamp industry having been affected by the lighting restrictions. Overseas trade has again shown an increase in volume, though in some territories, particularly China, conditions render profitable trading impossible. The liquid resources of the company at March 31st amounted to £1,304,000, an increase of £147,000. The ordinary share capital has been increased by the issue of 111,670 shares in satisfaction of the purchase of an associated business. In view of present conditions, the allocation to reserve has been increased, making the total £970,000. The number of employés shows a slight decrease, to 18,700. Meeting: July 12th.

### C. A. Vandervell & Co., Ltd.

A circular has been sent to shareholders regarding the conversion of their holdings under the reorganisation of capital. This covers the cancellation of 10s. of the £1 ten per cent. cumulative participating preferred shares and 6d. of the 1s. deferred shares. The two classes are consolidated into £1 ordinary shares. The shareholders are accordingly to receive one new ordinary share for every 40 deferred shares or two preferred shares.

### Anglo-Argentine Tramways Co., Ltd.

The gross receipts for 1926 were £4,495,401, and the working expenses (including amount carried to renewals reserve) £3,504,196, leaving £991,205. plus £40,671 for interest, &c. There are deducted £70,660 for annuity to City of Buenos Aires Tramways Co. (1904), Ltd., £70,660; debenture stock interest and sinking fund, £587,821; sinking fund for redemption of preference and ordinary capital, £9,230. Including £40,651 brought forward, there is £404,815 to be dealt with. The 5½ per cent. cumulative preference dividend absorbs £176,000, and the 6 per cent. cumulative second preference dividend £183,000, leaving £45,815 to be carried forward. The receipts from passenger traffic were £4,411,764, against £4,562,804 in 1925. Passengers carried were 542,098,609, against 559,537,275 in 1925. The working expenses were 73.61 per cent. of the receipts, as compared with 72.53 per cent. in 1925. The intensive programme of renewals and reconstruction was continued and extended. Renewals expenditure was £310,254, against £201,839 in the previous year. The allocation to renewals reserve was £250,000, as in 1925, and may be increased advantageously when circumstances permit. The equitable character of the company's proposals for a

revision of tariffs has been confirmed by examination and criticism. The question continued in suspense during 1926, but a renewal of the consideration of the company's petition by the municipal council is expected. The directors have nothing definite to report, but they hope that a final solution may not be delayed much longer. While the delay has borne hardly on the company, recognition is due to the desire of the authorities to examine every aspect of the question, even at the cost of temporary public inconvenience, before reaching a decision on which the future travel facilities in their great and growing city will depend. An early settlement of the question is very desirable for the following reasons: It would enable the company to increase its outlay on maintenance and renewals, and thus add to the efficiency of all its services; it would provide a greatly extended traffic service for the increasing population of the city; it would definitely settle the outstanding question of the company's contribution to the National Pension Fund; it would enable the company to improve the conditions of service for its employés; and it would be in conformity with the recognised rule that those who provide public utilities are entitled to a reasonable return on the capital employed, and if this reasonable condition is neglected, developments desirable in the public interests are inevitably retarded. The falling off in passengers carried was due largely to the competition of omnibuses. The company initiated an experimental service of omnibuses in the month of December. Lengthy extracts from a report by the general manager, M. Rongé, follow the directors' statement. Meeting: June 30th.

### United River Plate Telephone Co., Ltd.

The annual meeting was held on June 21st. Mr. P. Cross (chairman), who presided, in presenting the report, referred to the recent death of the deputy-chairman, Sir Frederick Green, K.B.E. He then reviewed the accounts (*vide* ELECTRICAL REVIEW, June 17th, p. 985), and said that the prosperity of the company continued. The number of stations connected increased last year to 158,088, an addition of 15,837, as against an increase of 10,805 in 1925. Within a month or so three new large automatic exchanges would be opened, and those would take care of the waiting applicants. They had overtaken the war arrears, and should now be able to keep abreast with future requirements. The automatic system was introduced in 1923, and since then over 50 per cent. of their c.b. manual plant in Buenos Aires had been converted with plant derived almost wholly from England. Orders had been placed for a further 20,000 lines, and the bulk of those should be in service by July, 1928. They had decided to erect new headquarters, which would also house three automatic exchanges with an ultimate capacity of over 30,000 lines. Extensions had been carried out in many directions, both in the capital and provincial districts. More attention had lately been given to the toll line service, which was now equal to those of many other countries. He could at present see no end to the telephone development in Argentina, and to meet future demands further new capital must be provided. They, therefore, proposed to raise the nominal capital from £6,000,000 to £7,000,000 by the creation of 200,000 shares of £5 each. He was unable to indicate when any of the new shares would be issued; it depended upon the delivery of large amounts of equipment now being manufactured. In any case, ample notice would be given to the shareholders. Mr. Cross, in conclusion, gave a quantity of statistics to show the magnitude and progress of the company's operations. The report and accounts were adopted, and subsequently the increase in the share capital was approved. Later, Mr. Cross said that rumours had been current that the company's business was being acquired by an American group. "Feelers" had been put out on behalf of the International Telephone and Telegraph Corporation, and he had on one occasion mentioned a price which the inquirers had thought a ridiculous one. He had on another occasion stated that the company did not want to sell its business, although the directors could not refuse to put any reasonable offer before the shareholders. Another large American group which had recently acquired control of the telephones of British Columbia and Portugal had approached him unofficially to see if the company could not join them in some combination designed to keep for British manufacturers' interests the large amount of equipment which they would need in the future. Personally, he could not see any purpose in that proposal. In conclusion, he said that anything vitally affecting their interests would be communicated to the shareholders at the earliest possible moment.

### British Electric Traction Co., Ltd.

Mr. J. S. Austen presided at the annual meeting on June 21st, and in proposing the adoption of the report (*vide* ELECTRICAL REVIEW, June 10th, p. 940), said the results were slightly better than those of the preceding year, and they were a great deal better than anticipated. He knew that there would be large losses on some of their undertakings which operated in mining districts, and those losses were fully realised, but he did not expect that the revenue from other sources would make those losses good. However, the wonderful recuperative power of the company had once more asserted itself, and they had not only made good those losses, but had actually done a trifle better. Beyond the strike there had been no event of vital importance. Perhaps the most important had been the completion of the power house at Stourport by one of their subsidiaries at a cost of about 2½ millions, which was lately opened by the Prime Minister. Referring to the bonus scheme which had been before the shareholders recently, he said he wanted to remind them what exactly the scheme was. It made no change whatever with regard to the preference stock. The ordinary stock now became an 8 per cent. preferred ordinary stock, and the new deferred stock which they were about to create would take all that was left. Some stockholders thought that in future they were going to receive 8 per cent. on their stock whatever happened. The true fact was that they would get 6 per cent., but the extra 2 per cent. remained contingent as it did before upon the balance remaining after 8 per cent. had been paid on the new preferred ordinary. The main object which the directors had in view in formulating the scheme had been to get back the capital that had been written off. The present bonus was, he hoped, only the first instalment, but if at the end of the current year they were able to pay a dividend of 10 per cent. or more, he would himself like to see it paid, not in cash but in stock. The decision as to which they would take would be in their own hands, but he thought that practically all shareholders would be quite satisfied to take stock. Mr. Emile Garcke seconded the motion, and it was carried unanimously. In proposing the re-election of the chairman and Mr. C. S. Hilton and Mr. A. Shepherd as directors, Mr. Garcke paid a tribute to the services of Mr. Austen. He said that about seven years ago the company was confronted with a new situation. They had accumulated considerable sums of liquid capital, and were confronted with the problem as to what was the best form of investment for the money. The board, after careful consideration, decided that it could best be employed in general investment, because at that time circumstances were not favourable for the employment of capital in tramways and other engineering enterprises. They decided, therefore, on expanding the financial side of the business. The difficulty was that finance required experience and expert knowledge, and the board at that time was more industrial than financial in its experience. They invited Mr. Austen to join the board, and he was appointed chairman. The business of the company had become more and more financial than industrial—a tendency which was distinctly in the interests of the stockholders. Mr. Austen had been of the greatest assistance to them throughout, and he was the author of the bonus scheme.

### International Telephone and Telegraph Corporation.

The consolidated accounts of the corporation and its associated companies for 1926 show total net earnings of $11,065,242 and a net income of $7,105,206. To this is added a surplus of $5,367,956 brought forward, making $12,473,162. After meeting dividends, &c., the earned surplus was $9,164,209, and the capital surplus $911,646, making a total of $10,075,855 at the end of the year.

### Stock Exchange Notices.

Dealings in the following have been specially allowed by the Committee under Rule 159:—

British Electric Traction Co., Ltd.—132,626 deferred ordinary shares of £1 each fully paid, Nos. 66,594 to 199,219.

The undermentioned have been ordered to be officially quoted:—

Lancashire Electric Light and Power.—250,000 seven per cent. cumulative participating preference shares of £1 each, fully paid, Nos. 750,001 to 1,000,000.

### Pinchin, Johnson & Co., Ltd.

Mr. E. Robson, presiding at the extraordinary general meeting on June 22nd, explained that the purpose of the meeting was to secure authority to increase the share capital to £1,350,000 by the creation of 250,000 additional £1 shares, to enable the company to acquire the assets and goodwill of the Red Hand Compositions, Ltd., a very successful company engaged in the ships' bottom and anti-fouling composition section of the paint trade. The business would continue to operate as a separate trading unit of their organisation. All the units of their business showed most satisfactory expansion, and they hoped to present extremely satisfactory results at the next annual meeting.

### Edgar Allen & Co., Ltd.

The profit for the year ended March 31st last was £13,337 (against £55,021 for 1925-26). To this is added £35,353 brought forward, making £48,690. It is proposed to pay a dividend of 3¾ per cent., free of tax, on the ordinary shares and to carry forward £18,374. The previous year's dividend was 5 per cent., tax free.

### Stanton Ironworks Co., Ltd.

The profit for the year 1926-27 was £234,617, as compared with £237,844 in the preceding year. To this is added £148,700 brought forward, making £383,117. It is proposed to pay a final dividend of 6 per cent., free of tax, on the ordinary shares, making 10 per cent., tax free, as for 1925-26. £50,000 is put to reserve and £153,159 carried forward.

### Montreal Light, Heat and Power Consolidated Co.

A dividend of $½ per share has been declared on the common shares for the quarter ended June 30th.

### Lisbon Electric Tramways, Ltd.

Mr. L. Breitmeyer, presiding at the annual meeting on June 22nd, said that the results of working again showed substantial progress. Passengers carried increased by 7,735,475, and receipts by 2,864 contos. Expenditure was slightly lower than in 1925, and revenue increased. The rate of exchange had remained steady; the conditions, therefore, had been favourable to the business. Agreements had been concluded with the Camara extending the period during which the present formula upon which tariffs were based was to remain in force. On the other hand, the company had agreed to carry out considerable extensions of the tramway lines, which would involve an expenditure of about £250,000. The directors had felt for some time past that the value of their undertaking had very materially appreciated, and that the capital invested in the business in no way represented the present position. A re-valuation was therefore decided upon, and from the results arrived at they were fully satisfied that the assets were far more valuable than shown in the accounts Under those circumstances the amount standing to the credit of the general reserve was set free, and could with every justification be capitalised with safety. This would permit a bonus distribution to the ordinary shareholders of one fully-paid ordinary share of £1 each for every two ordinary shares held. The meeting passed the resolution necessary to effect this.

### Thomas de la Rue & Co., Ltd.

The recently-issued accounts cover a period of 22 months ended April 2nd last. During the first ten months, a period of reorganisation, there was a loss of £19,066, but in the succeeding year the profit was £8,110. There is a credit balance of £9,154 to be carried forward.

### Ransomes & Rapier, Ltd.

The report for 1926 comments upon the adverse effects of the industrial disputes, which resulted in a loss of £12,054. The disposable balance, after providing for debenture interest, depreciation, &c., is £11,177, but the directors do not recommend the payment of an ordinary dividend.

### Dubilier Condenser Co., Ltd.

The accounts for the year ended March 31st last record a net profit of £12,260 (as compared with £53,505 in the preceding fifteen months). The addition of £3,857 brought forward makes available £16,117. The preference dividends to May 31st last require £12,000, and the balance is carried forward. For the fifteen months ended March 31st, 1926, the ordinary shares received a dividend of 5 per cent. Meeting: July 7th.

### Sphere Investment Trust, Ltd.

The annual meeting of this company (formerly the United Electric Tramways of Montevideo, Ltd.) was held on June 24th. Sir George A. Touche, Bt., chairman, in presenting the report (*vide* our last issue, p. 1028), said that since the last meeting the trust had altered its position. La Societa Comercial de Montevideo, in which they were interested, and La Transatlantica, the other company operating in Montevideo, had by agreement been vested in the Atlas Light and Power Co., Ltd. As a result the company's holdings now comprised mainly shares in the Atlas Co. By virtue of that the trust's interest in the Montevideo undertakings was a continuing one and not limited, as formerly, to one local company or even to Montevideo itself. It was intended to broaden the trust's interests still further, and the sanction of the High Court had been given to that departure and also to the division of the £5 shares into shares of £1 denomination. Henceforward the company's business would be conducted on the lines of an ordinary investment trust company. The trust's accounts did not include any dividend on the ordinary shares in the Atlas Co., for they were closed before any declaration had been made. The matter would, however, right itself in the current year.

### Greenwood & Batley, Ltd.

The directors report a balance of £25,891 at the credit of the profit and loss account for the year ended March 31st last. After deducting the final preference and ordinary dividends for the preceding year there remains (with £20,175 brought forward) a balance of £43,842. £6,000 is reserved for depreciation, and it is proposed to pay a final dividend of 2½ per cent. on the ordinary shares, making 5 per cent. for the year, as for 1925-26. £13,394 is carried forward. Meeting: To-day (Friday).

### Marconi's Wireless Telegraph Co., Ltd.

The dividend in respect of the half-year ended June 30th has been declared on the 7 per cent. cumulative participating preference shares.

### Victoria Falls and Transvaal Power Co., Ltd.

A final dividend of 1 per cent. (making the maximum of 10 per cent. for the past year) has been declared on the participating preference shares, together with a dividend of 3 per cent. in respect of the half-year ended June 30th. The final ordinary dividend is 12 per cent., making 15 per cent. for the year (as against 14 per cent. for 1925).

### New General Traction Co., Ltd.

The profit for the year ended March 31st last increased from £10,425 to £10,616. £1,688 brought forward makes available £12,304. A dividend of 4½ per cent. is recommended, £2,000 is transferred to reserve, £3,000 is devoted to writing down investments, and £872 is carried forward. The Norwich Electric Tramways Co., Ltd., made a net profit of £20,390, and the addition of the balance brought forward made £21,995. Of this £10,000 was transferred to reserve, a dividend of 4 per cent. was paid, and £1,435 is carried forward.

### Eastern Extension, Australasia and China Telegraph Co., Ltd.

Interim dividend for three months ended March 31st last of 5s. per share, free of income tax.

### Eastern Telegraph Co., Ltd.

Dividend at the rate of 3½ per cent. per annum, less income tax, on the preference stock for the quarter ended June 30th, and a first quarterly interim dividend of 2½ per cent. on the ordinary stock, free of income tax.

# Stocks and Shares.

MONDAY EVENING.

### The Turn of the Half Year.

WITH the end of the first half of the year, Stock Exchange markets are inclined to harden up. Heavy losses have been incurred, in the City and in the provinces, through a few wildly-moving industrial shares, and, to meet liabilities, other holdings have had to be realised. Money continues to be demanded for new issues. Many of the recently-offered stocks are not yet paid up in full. Nevertheless, the floating supply of capital appears to be ample for all requirements, and gilt-edged stocks show strength. The new West Midlands Joint Electricity Authority 5 per cent. stock, of which the public took no more than 40 per cent., has rallied to ¼ discount after being down to 1 discount. The issue price was the high one of 98, but this did not deter investors, and the underwriters have been able to get out at a profit, if they cared to take it, by selling at ¼ discount or thereabouts. Allotments of Lancashire Electric Light & Power 5 per cent. debenture stock reached London subscribers on this, Monday, evening. A premium is expected to develop in the morning.

### Henleys and Callenders.

Henleys are very firm at 4¼ and Callenders at 3 7/16. The Henley report shows a diminution of about £7,000 in the net profit, to £251,776, but the directors are not likely to be criticised, at the meeting on the Friday in this week, for having raised the year's dividend from 20 per cent. to 25 per cent. The company's financial position is very strong. One shareholder was heard to regret this, because, he lamented, it may mean that "we shall not see a new issue of shares, at a bonus price," to pay for the work just undertaken by Henley's for the G.I.P., and the Eastern Telegraph.

Callender's net profit for last year is announced at £273,025, a decrease of £16,600 as compared with 1925. The strike and coal stoppage of 1926 are debited as being the reasons for the shrinkage; upon several days the factory was entirely closed. The dividend remains at 15 per cent. on the ordinary share capital, this requiring £120,000 as against £85,000 in the previous year, before the capitalised bonus ranked for the full rate. Callender's meeting takes place on Thursday, the day before Henley's.

### G.E.C. Dividend Effect.

General Electrics fell back 1s. to 29s. 6d., there having been some hope that the dividend might be raised to 10 per cent., whereas it is kept at the previous 7½ per cent. The optimism was encouraged, it is but fair to say, by bucket-shops and outside brokers who broke into lively enthusiasm over their dividend prophecies. More cautious estimates doubted whether the strike-year experiences would permit of any advance in the 7½ per cent. rate.

Metropolitan-Vickers are slightly harder—though no change is made in the nominal quotation—on the securing by the company of a big contract offered by the Edinburgh Corporation. A 1/16 fall reduced the price of Siemens to 26s. 3d. It may be observed that at this figure Siemens pay 5¼ per cent on the money. General Electric ordinary, the dividend on which is the same as that of Siemens, yield 5¼ per cent. at the present price of 29s. 6d. *cum* dividend. Other manufacturing shares are steady. India Rubber, Gutta Percha remain dull at 20s.

### Cable Strength.

The Eastern Telegraph and its associated Eastern Extension Australasia and China Telegraph Companies have declared their usual quarterly dividends of 2½ per cent. and 5s. respectively, both net, payable on July 15th. The prices are unchanged. Eastern ordinary stock returns 5½ per cent. free of tax, and Eastern Extensions pay a little less, at current quotations. In view of the strength of the companies' financial position, the issues make sound industrial investments. Western Telegraphs are ½ up at 17⅞. The price went ex dividend on June 16th, but, allowing for this, the shares are decidedly lower than either of the two Eastern stocks. Globes retain their pre-eminence as the highest-priced in the group at 18⅛. Anglo-American Telegraph stocks are better in both cases. A little trade is doing in American Telephone and Telegraph capital stock, the basis being 170 xd. The company pays quarterly dividends of 2¼ per cent. International Telephone & Telegraph common went back to 143½. This is the company which has lately been a good deal in the limelight through its accumulation of shares in several South American telephone undertakings. Its present aim is presumed to be the securing of control of the United River Plate Telephone Co. The chairman of the latter made a very interesting reference to the subject at last week's meeting, and the price has moved up another 20s. to 10¾.

Bogota Telephones are a good market at 36s. on the company's proposal to issue new shares, as rights, to the proprietors. Venezuela Telephones touched 30s. before returning to 28s. 6d. for ordinary and preference alike.

### Wireless.

Holders of Marconi 7 per cent. participating preference shares are to receive their regular 7 per cent. rate, 8.4d. per share, this week. No declaration of a dividend on the ordinary shares has been made, however, and the price is accordingly dull at a shade below 20s. The assumption is that a dividend on the ordinary would have been forthcoming had it not been for the revival of opposition to the reorganisation plan. Marconi Marines hold their strength at 27s. Canadian Marconis, upon cessation of the support from Montreal, reacted to 5s., but were promptly put up again to 5s. 4½d.

A drop of 1s. took Telephone Manufacturing to 6s.; a good many shares have been turned out since the issue of the report, and apparently by proprietors who had anticipated a dividend in the near future. Dubilier Condensers were unchanged at about 3s. 9d. upon the issue of another depressing report. Ever Ready shares, after a dip to 4, rallied to 84s. 3d.; the price is now ex dividend.

### Further Fall in Brazilian Tractions.

The madness of the gamble in Brazilian Tractions has subsided, and the price is another 4 points lower, following upon last week's decline of 8. People who had been operating in Brazilian Tractions have turned their attention to artificial silk, and it may be that the change-over has led to selling of Tractions in order that the money thus realised can be employed elsewhere. The preference at 134 xd. are 10 points down on the week, making a drop of 17 in a fortnight. Barcelona Tractions revolve around 50, and Sidros are 15. Victoria Falls ordinary improved on the issue of the report, in which a dividend making 15 per cent. for the year is declared. This is an increase of 1 per cent., and the participating preference will receive their maximum dividend of 10 per cent.

### Two Strong Features.

Home electricity shares are unchanged save for a sixpenny gain in Edmundson's ordinary. County of London Electric new debenture is steady at ¾ premium. Of the foreign issues, Tokio 6 per cent. bonds are better at 89, and Whitehall sixes have risen to 102, the company's 7½ preference being harder at 20s. 9d. Lisbon Electric Trams, which went up to 21s. 6d. on the announcement of a share bonus, have kept their gain, and the company's 5 per cent. debenture stock has put on 14 points, to 77.

A still more dramatic movement is that in British Electric Tractions. The price, quoted ex rights, is nominally 28 points at 123. The rights consist of the new deferred shares, the price of which started, a few days ago, at 50s., equivalent of 25 points on the ordinary stock. Buyers came forward at once, and the price of the deferred has gone up to £4. Taking this into account, the present price of B.E.T. ordinary at 125½ is substantially better on the week. Of other new issues, Electric Finance preference strengthened to 21s. 4½d. for the £1 shares fully paid.

### Undergrounds Up.

Dividend hopes are responsible for a rise of 1s. 6d. in Underground Electric Railways of London £1 shares, to 19s. 6d. Some people speak of a possible dividend of 5 per cent. for the current year, as against the maiden 1½ per cent. paid in respect of 1926. Districts have shot up to 66½, but Metropolitans fell back to 59½. In the steam stocks, the tendency is capricious and irregular. Even the popular issues leave the investor as cold as the weather. Industrial conditions are not considered bright enough to justify a return of confidence and capital to Home Railway stocks as a whole. Hopes of immediate recovery in rubber shares have suffered partial eclipse by attractions of other and more active industrials. The iron and steel group is tolerably steady.

## Share List of Electrical Companies.

| | Nom. £ | Dividend. 1925. | Dividend. 1926. | Price June 27 1927. | Rise or fall. | Yield. p.c. |
|---|---|---|---|---|---|---|
| **HOME ELECTRICITY COMPANIES.** | | | | | | |
| Bournemouth and Poole | 1 | 14 | 14 | 59/6 | — | 4 14 1 |
| Brompton Ordinary | 1 | 10 | 8⅝ | 25/- | — | 5 12 0 |
| Charing Cross Ordinary | 1 | 15 | 8½ | 25/6 | — | 5 12 0 |
| do. do. 4½ Pref. | 1 | 4½ | 4½ | 17/6 | — | 5 2 10 |
| Chelsea | 1 | 12 | 8⅝ | 25/- | — | 5 12 0 |
| City of London | 1 | 15 | 10 | 27/- | — | 7 8 2 |
| do. do. 6% Pref. | 1 | 6 | 6 | 22/6 | — | 5 6 8 |
| Clyde Valley | 1 | 8 | 8 | 30/6 | — | 5 5 0 |
| County of London | 1 | 15 | 7½ | 28/- | — | 5 0 0 |
| do. do. 6% Pref. | 1 | 6 | 6 | 22/6 | — | 5 6 8 |
| Edmundson's Ordinary | 1 | 7 | 8 | 30/- | +6d. | 5 6 8 |
| do. 7% Pref. | 1 | 6 | 7 | 21/- | — | 5 16 8 |
| Elec. Supply Corporation | 1 | 10 | 10 | 32/- | — | 6 5 0 |
| Kensington Ordinary | 1 | 15 | 8 | 25/6 | — | 6 5 6 |
| Lancs. Light and Power | 1 | 7½ | 7½ | 26/- | — | 5 15 5 |
| London Electric | 1 | 10 | 8½ | 24/- | — | 5 16 8 |
| do. do. 6% Pref. | 5 | 6 | 6 | 5⅝ | — | 5 6 8 |
| Metropolitan | 1 | 11 | 5 | 29/- | — | 4 16 7 |
| do. 4½% Pref. | 1 | 4½ | 4½ | 17/- | — | 5 8 6 |
| Midland Counties | 1 | 5½ | 6 | 22/6 | — | 5 6 8 |
| Newcastle-on-Tyne Ordinary | 1 | 7 | 5 | 22/6 | — | 4 8 6 |
| do. 5% Pref. | 1 | 5 | 5 | 17/6 | — | 5 14 3 |
| do. 7% Pref. | 1 | 7 | 7 | 24/6 | — | 5 14 3 |
| Notting Hill 6% Pref. | 10 | 6 | 6 | 10½ | — | 5 17 1 |
| North Met. Elec. 6% Pref. | 1 | 6 | 6 | 22/- | — | 5 9 1 |
| St. James' and Pall Mall | 5 | 17½ | 8 | 25/6 | — | 5 9 10 |
| South London | 1 | 15 | 8½ | 25/- | — | 5 12 0 |
| South Metropolitan Pref. | 1 | 7 | 7 | 1¾ | — | 6 3 0 |
| Urban Ordinary | 1 | 7 | 7 | 25/- | — | 5 12 0 |
| do. 6% Pref. | 1 | 6 | 6 | 1⅛ | — | 5 13 0 |
| Westminster Ordinary | 1 | 15 | 8½ | 25/- | — | 5 12 0 |
| Whitehall Elec. Invst. 7½% Pref. | 1 | 7½ | 7½ | 20/9 | +3d. | 7 4 7 |
| Yorkshire Elec. | 1 | 8 | 8 | 30/- | — | 5 6 8 |
| **HOME RAILS.** | | | | | | |
| Central London Ord. Assented | Stock | 4 | 4 | 71 | — | 5 12 8 |
| Metropolitan | ,, | 5 | 8 | 59½ | —½ | 5 0 7 |
| do. District | ,, | 3½ | 3½ | 66½ | +3 | 5 15 4 |
| Underground Electric | £1 | Nil | 1½ | 19/6 | +1/6 | 1 10 9 |
| do. do. Income | Bonds | 6 | 6 | 102 | — | *5 17 8 |
| **TELEGRAPHS AND TELEPHONES.** | | | | | | |
| Anglo-Am. Tel. Pref. | Stock | 6 | 6 | 101½ | +½ | 5 18 3 |
| do. Def. | ,, | 1½ | 1½ | 24¾ | +¼ | 6 1 5 |
| Automatic Telephone | 1 | 8 | 10 | 47/6 | — | 4 3 6 |
| Chili Telephone | 5 | 5 | 6 | 7⅛ | — | 3 17 5 |
| Eastern Extension | 10 | 10 | 10 | 18¾ | — | *5 6 8 |
| Eastern Tel. Ord. | Stock | 10 | 10 | 182½ | — | *5 9 7 |
| Globe Tel. and T. Ord. | 10 | 10 | 10 | 18¾ | — | *5 6 0 |
| do. do. Pref. | 10 | 6 | 6 | 11⅛ | — | 5 8 1 |
| Great Northern Tel. | 10 | 20 | 20 | 28½ | — | 7 0 4 |
| Indo-European | 25 | 8½ | 10 | 45½ | — | *5 7 6 |
| Marconi | 1 | Nil | Nil | 1 | — | ... ... |
| Marconi-Marine | 1 | 7½ | 8¾ | 27/- | — | 6 9 8 |
| Oriental Telephone Ord. | 1 | 12 | 12 | 53/9 | — | *4 9 4 |
| United R. Plate Tel. | 5 | 8 | 8 | 10⅞ | +1 | *8 14 5 |
| Western Telegraph | 10 | 10 | 10 | 17⅞ | +⅛ | *5 13 6 |
| **HOME AND FOREIGN TRAMS, &c.** | | | | | | |
| Anglo-Arg. Trams First Pref. | 5 | 5½ | 5½ | 8½ | +1/16 | 7 17 2 |
| do. do. 2nd Pref. | 5 | 6 | 6 | 8⅞xd | — | 8 8 6 |
| do. do. 5% Deb. | Stock | 5 | 5 | 73½ | — | 6 17 11 |
| British Electric Traction Ord. | ,, | 8 | 8 | 125½xr. | — | 6 7 6 |
| do. do. 6% Pref. | ,, | 6 | 8 | 122½ | +1 | 6 10 0 |
| Brazil Traction | 100 | 5 | 6 | 103 | —4 | 3 13 7 |
| Brit. Columbia Elec. Rly. Pcc. | Stock | 5 | 5 | 90½ | — | 5 11 9 |
| do. do. Preferred | ... | 6¾ | 6¾ | 130xd | — | 5 4 2 |
| do. do. Deferred | ,, | 8 | 8 | 155xd | — | *5 3 3 |
| do. do. Deb. | ,, | 4½ | 4½ | 80½ | — | 5 5 7 |
| London & Sub. Trac. 5% Pref. | 1 | Nil | Nil | 8/- | +3d. | Nil |
| London United Tram. Deb. | Stock | 4 | 4 | 59½ | — | 7 12 5 |
| Mexico Trams, 5% Bonds | — | 5 | 5 | 81½ | — | 6 2 8 |
| Mexican Light Common | 100 | Nil | Nil | 43 | — | Nil |
| do. Pref. | 100 | Nil | Nil | 106½ | —2 | Nil |
| do. 1st Bonds | — | 5 | 5 | 73½ | —1 | 6 17 0 |
| Yorkshire (West Riding) | 1 | 5 | — | 8/9 | — | ... ... |
| **MANUFACTURING COMPANIES.** | | | | | | |
| Babcock & Wilcox | 1 | 18 | 18 | 52/6 | — | 4 19 1 |
| British Aluminium Ord. | 1 | 12½ | 10 | 43/- | — | 4 13 0 |
| British Elec. Transformer Pref. | 1 | Nil | 7 | 18/3 | — | 7 13 6 |
| British Insulated Ord. | 1 | 15 | 15 | 67/6 | — | 4 8 11 |
| Brush Ord. | 1 | 10 | 10 | 26/3 | — | 7 12 4 |
| Callenders | 1 | 15 | 15 | 3⅞ | — | 4 7 2 |
| do. 6½% Pref. | 1 | 6½ | 6½ | 23/9 | — | 5 9 5 |
| Crompton Ord. | 1 | Nil | Nil | 12/6 | — | ... ... |
| Edison-Swan | 4/- | 10 | 10 | 10/ | — | 4 0 0 |
| do. 5% Deb. | Stock | 5 | 5 | 85 | — | 5 17 8 |
| Electric Construction | 1 | 10 | 7½ | 26/3xd | — | 5 14 3 |
| Enfield Cable Pref. | 1 | 7½ | 7½ | 25/6 | — | 5 17 8 |
| English Electric | 1 | Nil | Nil | 10/- | — | ... ... |
| do. do. Pref. | 1 | 8 | — | 12/6 | — | ... ... |
| Gen. Elec. Pref. | 1 | 6½ | 6½ | 23/6xd | — | 5 10 8 |
| do. Ord. | 1 | 7½ | 7½ | 29/6 | —1/- | 5 1 8 |
| Henley | 1 | 20 | 25 | 4½ | — | 5 5 3 |
| do. 4½% Pref. | 5 | 4½ | 4½ | 4½ | — | 5 6 0 |
| India-Rubber | 1 | 5 | 5 | 1 | — | *5 0 0 |
| Johnson & Phillips | 1 | 17½ | 12½ | 2½ | — | 5 0 0 |
| Met.-Vickers Ord. | 1 | 8 | 8 | 27/6 | — | 5 11 4 |
| do. Pref. | 2 | 8 | 8 | 2¾ | — | 6 14 9 |
| Siemens Ord. | 1 | 7½ | 7½ | 26/3 | —⅛ | 5 14 3 |
| Telegraph Construction | 12 | 10 | 10 | 28½ | — | *4 4 2 |

* Dividends paid free of Income Tax.

# The Electrical Contractors' Association.—I.

### Convention at Scarborough.

FROM Wednesday to Friday last week, the E.C.A. Allied Associations held their second annual conference at Scarborough. Nearly 400 delegates and friends were present, and although the weather was at times of a very doubtful character, the meeting was a complete success on both the business and the social sides. The Associations have so far shown great wisdom in their choice of a place for their convention. Brighton last year and Scarborough this year, were calculated to attract not only those keen members who would attend whatever town was chosen, but also those who perhaps need a little extra persuasion.

As we indicated in our last issue, the papers presented were of a high order and the discussions upon them brought out many pertinent contributions which teemed with hints of helpfulness to those engaged in the installation branch of the electrical industry. Many references were made to the latest Electricity (Supply) Act, and especially to Clause 48 (the "agreed" Clause). The general feeling was that the Act could only result in good to the industry and to the community.

The convention opened on Wednesday evening with a reception of the delegates by the President (Mr. H. J. Miles). This was followed by a very enjoyable dance which (to use the accepted phrase) continued until a late hour.

The business part commenced at Olympia (an admirably-adapted hall) on Thursday morning. The annual general meeting was a private one and it must suffice for us to say that the Association's officers all presented reports which showed growing strength in all directions—membership, finance and influence. The President's report which was presented is given in abstract form later in this article. The report showed that the influx of new members during the year reviewed was 140, with the result that the membership had reached four figures. The growing importance of the Association was emphasised; for the first time in their history they had received recognition in an Act of Parliament, *i.e.*, in the "agreed clause" of the Electricity (Supply) Act, 1926. Mr. Miles said that while in many cases conferences with other sections of the industry had been productive of good, in other cases there appeared to be no conclusive results. Such meetings as the latter class were more than disappointing, and "ways and means must be found, where necessary, to apply the Association's weight in support of its reasoned demands." The report went on to say that the membership of the Electrical Contractors' Association represented an important buying and trading force, and ways and means were certainly not far to seek to bring that force into effective operation.

After a brief interval for coffee, the delegates reassembled to receive a civic welcome from the Mayor of Scarborough (Alderman J. Bielby). The Mayor, who was accompanied by the Mayoress, spoke of the beauties and facilities of the town and urged the visitors to take full advantage of their brief stay. Mr. Miles returned thanks on behalf of the Association, saying that the town had taken extraordinary pains to provide for the convenience and entertainment of the delegates. Olympia had been placed at their disposal for the business meetings and the excellent Council Chamber of the Town Hall had also been lent them for their Council meetings. On the social side, arrangements had been made for each day of the conference. Mr. Miles made reference to the recent taking over of the local electricity undertaking by the Corporation, and said that he thought that the Mayor's invitation to the Association to hold the convention in Scarborough, was a happy augury of the relations which would exist between the Corporation and the electrical contractors of the town. He urged the Corporation to remember that the "agreed clause" of the Electricity (Supply) Act, 1926, was permissive, not instructive.

After a vote of thanks had been passed to the Mayor, Mr. Miles delivered his presidential address which is reproduced in shortened form below. This address emphasised the growing strength of the Association. An important matter dealt with was, of course, the "agreed clause," and Mr. Miles spoke with satisfaction of the fact that those who had conducted the negotiations leading up to its insertion in the Act were for the most part continuing their work as members of the statutory committee appointed by the Electricity Commissioners.

Following the address the meeting adjourned to the beach for the taking of the official photograph. After one or two attempts which were frustrated by heavy showers this was accomplished.

The afternoon session was devoted to the reading and discussion of Mr. Grierson's paper on "Some Interesting Points on Modern Installation Work." Both paper and discussion are dealt with later. At the outset Mr. Grierson was accused of adopting a selfish and bellicose attitude, but he explained in his reply that such was not his intention. One-sidedness, against the contractor, was already too evident; he merely aimed at remedying that state of affairs by the production of an agreed form of contract. Much argument centred about the definition of prime cost and provisional sums; Mr. Finlay said that Scotland was in advance in that respect for the matter had been settled. It would appear that the main obstacle to the adoption of a standard form of contract by the Association is the attitude of some of the members whose ideas are at variance with those of the majority. That, however, would appear to be a matter susceptible of settlement by discussion and compromise. Mr. Moss's suggestion that the paper should be further studied by the branches was a sound one. It would be a pity if the interest in a contribution of such potential value to contractors were allowed to die with the end of the convention. The relations between architect, builder and contractor were dealt with in the paper, but the general impression gained from the discussion was that the existing arrangements would have to stand. In any case the adoption of a standard form of contract would obviate any change in that respect.

On Thursday evening a smoking concert was held at the Grand Hotel when an excellent programme was presented and thoroughly enjoyed by a very large gathering.

Friday morning was very wet (the previous day was merely showery). The business of the day was the presentation and discussion of papers on "Estimating and Costing for Electrical Contractors" by Mr. J. Kirkham and "The Electrical Showroom as a Commercial Proposition and its Relation to the Industry" by Mr. H. E. Walker. We propose to reproduce these and the discussions upon them in our next issue.

Mr. Kirkham aimed at showing the importance of correct costing in the contracting industry. By means of charts, the author compared the accounts of four building contractors and four electrical contractors, giving the average in each case, and analysed the turn-

overs to show material and labour costs, overhead charges and profit. One or two speakers did not agree that the relative proportions of labour and material were typical of the industry. Mr. Rawlings, who, supporting the author, attacked the soundness of rates produced by the London Committee, was in turn taken to task by Mr. Flower, who maintained that the basis of those rates was arrived at after very careful study. To Mr. Cross, who justly pointed out that in spite of the title, little was said about estimating, Mr. Kirkham replied that that was because he was sure his audience knew far more about the matter than he did.

Mr. Walker's paper pointed out that the business of electricity generation and distribution was big enough for municipalities to deal with, without their setting up installation departments or competitive sales organisations. The author maintained that the contractors were the people to provide the additional showrooms which would inevitably be needed. In the discussion, however, some speakers (notably Mr. J. Orringe) advocated co-operation with municipal supply authorities. While it was agreed that contractors in large towns could successfully operate on their own, it was suggested that in smaller towns, reliance would have to be placed on the supply authority unless the contractors cared to co-operate among themselves in the matter of showrooms. Mr. T. E. Alger objected to the opening of showrooms by municipalities in places where contractors' displays already existed.

The next business of the Conference was the passing of a vote of thanks to the Corporation of Scarborough for its hospitality and attention to the welfare of the delegates. Mr. Miles said that as the weather had rendered impossible the holding of the proposed garden party at Peasholm Park, Alderman Whitfield, chairman of the Corporation Entertainment Committee, had arranged for an afternoon function in Olympia. Military and dance bands would provide music. Mr. Miles also mentioned that Miss Haslett, of the Electrical Association for Women, was present, and although lack of time debarred her from speaking, she would be glad to discuss matters with any of the delegates.

A vote of thanks to the authors of the papers presented was then passed, followed by one to the Conference Committee.

In relinquishing office, Mr. Miles said that Mr. Shaw needed no introduction to the members; he had already served them well, and had been president before. His re-election to the position was an expression of the Association's confidence in his character and abilities. Mr. W. A. Shaw then delivered his concluding address, prefacing it with a brief review of the progress which the Association had made since his last term of office.

Then on behalf of the members, Mr. Miles presented Mr. C. V. Fisher, the Conference secretary, with a gold watch in recognition of his activities in connection with the Convention. Mr. Fisher made a brief response, and then Mr. Miles announced that the Council had presented him with a gold cigarette case. Mr. W. H. Walton also spoke on his re-election as vice-president.

Another presentation ceremony then took place. Mr. R. Robson, who has been honorary secretary to the Northern Section for 21 years, was given a collection of photographs of past and present members of the Section, glazed and framed, a presentation of his own choice. Mr. Robson, in returning thanks for the gift, said that Association work had been his hobby, and had always given him the greatest pleasure.

The conversazione and dance in the afternoon was well attended, and proved a thorough success. In the evening the delegates were the guests of the Mayor at a ball and supper at the Grand Hotel. This formed a happy conclusion to a very successful Convention.

During the Convention an exhibition of "Frigidaire" apparatus was held in the drawing room of the Grand Hotel. The display, which was under the control of Mr. Parsons, the local agent, consisted of two working models of the refrigerating equipment, and examples of refrigerator cabinets and ice-cream boxes.

## Presidential Address.

By H. J. MILES, M.I.E.E. (*Abstract.*)

In his address the retiring President said that the number of registrations for the conference represented a substantial advance on the attendance at last year's conference. His year of office had established a "record" in the number of new members elected to the Allied Associations, and the financial position was substantially stronger than ever. The measure of official recognition extended to the associations to-day was immeasurably greater and more valuable than was extended to them years ago. The Council and its many committees had been actively engaged throughout the year on matters of very great importance. He made particular mention of the persistent work of the E.C.A. Trading, Law and Parliamentary, Development and Apprenticeship Committees. It was the object of the Trading Committee to improve and consolidate the general conditions under which business was carried on within the electrical industry. To that end the committee had been in negotiation, during the past year, with many kindred electrical associations and had achieved—at least in some cases—important trading advantages for the members. In that direction their main policy was wholly protective. The E.C.A. was certainly not aggressive. Situations might arise, however, in which attack was the only available form of defence; and where they discovered what they conceived to be evils existing in the industry, they would have no hesitation in attacking them in the strongest possible way. The work of the Apprenticeship Committee was also worthy of very hearty recognition. The boys of to-day were the operatives of to-morrow and their value to the trade was a responsibility that lay entirely upon the members' shoulders. It was not enough to teach them the practical details of their craft; they must be given the encouragement and opportunity to study the theoretical side of their work, and to that end the medals and money awards offered by the Association to successful competitors in the City and Guilds of London examinations represented valuable contributions to the common good of the whole industry. All the City and Guilds Examiners in wiring work—Mr. W. R. Rawlings, Mr. H. J. Cash, and Mr. H. Marryat—had been presidents of the Association.

Referring to the Electricity (Supply) Act, Mr. Miles said that he thought the measure, if properly administered, would be of immense benefit to all electrical interests. Taking the broadest possible view of the Act, its provisions must result in a greatly increased use of electricity by the general public. It had to be remembered that the Act was not drawn up for the sole benefit of the electrical industry—much less with the idea of benefiting any particular section of that industry. It was framed in order to develop a cheap and efficient supply of electricity for the general community, and it was the duty of all electrical men to follow that main principle in the reorganisation of their own particular section of the trade. No sound electrical progress would be achieved except on the lines of a fair return for services rendered, and in that direction the supply authority, the manufacturer and the reputable wholesaler and contractor were labourers in the common national good and were worthy of their hire. He re-affirmed his belief that a standardised "Wiring Code" would be of material assistance in electrical development on sound and equitable lines. A great deal of "cheap" installation work was being done that would not comply with any reasonable code. He did not believe that prices for installations would tend to increase if that class of work was prohibited. If the manufacturer was not called upon to provide ample cover for bad debts incurred with so-called "cheap" contractors he could in many cases reduce substantially the first cost of his products. Standardisation would also reduce stocks and save overhead expenses—all tending to cheapen the production of a reliable, standard job. To secure economy at the expense of safety was wholly false.

Reverting to the Electricity (Supply) Act, the speaker said that the men, representing all sections of the industry, who laboured through the difficult initial stages of the Bill, did not drop their work as soon as the measure became law. They still continued to meet at frequent intervals to discuss the best and fairest means of administering the Act to the greatest advantage of all sections of the industry and the public. He trusted that, in due course, those men would practically constitute the Statutory Committee set up under the Act, as that would ensure continuity of thought and action. A real endeavour was being made to put the Act into operation without one section of the industry advancing at the expense of another. The President concluded with an expression of his thanks to the staff and officials of the Associations.

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## Annual Report.

By H. J. MILES, M.I.E.E. (*Abstract.*)

In his report on the past year's work, the President stated that the Associations had experienced a very successful year, in which substantial and useful progress had been made. During the year they had enrolled something like 140 new members, and had thus established a "record." For the first time in their history the total membership of the E.C.A. Allied Associations stood at four figures. During the year new sub-branches had been formed at Preston and Cork,

and very definite developments were in progress at Chesterfield, Cambridge, Exeter, Plymouth, Hastings, and other places. He and the General Secretary visited Ireland recently and assisted in the formation of an Irish Section, including branches in Northern Ireland and the Irish Free State. The new section had been working extremely well. He urged the Central and Branch Development Committees to continue their good work with unceasing vigour, to secure the nomination and election of every reputable contractor in the country. It was the personal duty of each member to secure the distribution of the new "Development" booklet published by the Association, entitled "Business is Business," among all reputable "outsiders," and to use his personal influence to secure their enrolment.

By far the most important event of the past year had been the passing of the Electricity (Supply) Act. In his presidential report last year, Mr. Alger told them a great deal concerning the preliminary negotiations in connection with the Act and concerning the compromise that was arrived at in connection with the "Agreed Clause" No. 48. Here, again, he ventured to assert that the position of electrical contractors in general, and the standing of the Electrical Contractors' Association, were both infinitely stronger than they were only 12 months ago. For the first time in their history the electrical contractor was given recognition in an Act of Parliament by the "agreed clause" in the Electricity (Supply) Act, 1926, while the Electrical Contractors' Association had been recognised by the Government as representing the voice of the British installation trade. The negotiating body representing all sections of the electrical industry was still functioning, and very considerable progress had been made in preparing the ground for the Statutory Advisory Committee that had been set up to deal with the provisions of the clause. In that connection a "Memorandum" containing advice and suggestions concerning the practical administration of the Act had been prepared, agreed and circulated. The Statutory Advisory Committee consisted of an independent chairman and members nominated by the various associations representing the whole industry.* Very important work had also been done by the Trading Committee during the past year in its negotiations with kindred electrical associations and in attending to the trading complaints of members in all parts of the country. The volume of work handled by the Committee had been so large that it had been compelled to meet monthly and to devote the entire day to its labours. Meetings had taken place with representatives from practically every other section of the electrical industry. In many cases those conferences had been productive of immediate good to the trade. In other cases, however, they had obtained the impression that certain sections of the industry were willing enough to meet them in amiable discussion, but the practical results of the conferences tended to be somewhat elusive. Such meetings were more than disappointing, and ways and means must be found, where necessary, to apply the Association's weight in support of its reasoned demands. The apparent futility of certain recent negotiations in the trading field had attracted the serious attention of the Council. The membership of the Electrical Contractors' Association now represented an important buying and trading force, and ways and means were certainly not far to seek to bring that force into effective operation. They desired to secure improved trading and other conditions by reasoned argument, but where such amicable negotiations led nowhere at all, then other and more strenuous means must certainly be adopted. Not all—or even a majority—of their inter-trade negotiations were fruitless. Indeed, the contrary was the fact. Important trading improvements had been established during the past twelve months, and only in certain directions had a condition of stalemate been reached. Every conference that had taken place, however, had fostered mutual understanding and goodwill, and at least to that extent no conference could be regarded as entirely useless. The accounts showed that they were stronger financially than ever before.

In expressing his thanks to all who had worked on behalf of the Associations, Mr. Miles made special reference to the improvement of the *Electrical Contractor*, remarking that it had been immensely improved since Mr. Kennedy had given his whole time to its production. In conclusion he said that he knew that his successor, Mr. Shaw, would serve them well, and that Mr. Walton, who had consented to retain the vice-presidency, would be of great assistance to him.

## Address by the New President.

Mr. W. A. Shaw, A.M.I.E.E., upon taking office, delivered a brief address. He said that he believed that the ensuing twelve months would prove to be one of the most important periods in the whole history of the British electrical trade. The Electricity (Supply) Act had conferred considerably increased powers upon all local authority supply undertakings with the sole object of extending the domestic and general use of electricity in the country. It was the obvious duty of all sections of the electrical trade to put the Act into proper and effective operation. Concerning electrical showrooms they had been given the clearest possible lead by Mr. Walker. In those areas where contractors' showrooms were few and far between, their members must wake up and establish such centres of public electrical display and education, or the retail trade would assuredly fall into other hands. In many instances, useful showroom agreements had been arranged between electrical contractors and the local supply authority. Such highly desirable and mutually helpful understandings should be secured in all districts. Contractors must pay special attention to salesmanship. Every lighting installation provided an opportunity to secure further orders for vacuum cleaners and other current-consuming apparatus—and every such opportunity must be nursed with the utmost business persistence. He did not recommend the adoption of all the sales methods at present being used. The tactics adopted by certain manufacturers to dispose of their vacuum cleaners was not salesmanship, but persecution, and the canvassers did considerable harm to the general trade. A great deal of good spade work had been done by the W.O.B. Campaign, and particularly by the "Electric Circles" set up. The E.D.A. was endeavouring to keep those circles in being as permanent features of the industry. The circles provided electrical contractors with an excellent opportunity to bring home to the supply industry the fact that installation engineers represented the central station's best canvassers. Electrical contractors had performed an immense work in building up the present load carried by supply authorities, but their services were not fully appreciated in all areas. In certain areas, however, the most helpful co-operation existed between the central station and local contractors, and in those districts where that useful spirit was not very apparent a vigorous "Electric Circle" might be depended upon to achieve very beneficial results. So far as municipal wiring departments were concerned he was convinced that they could demonstrate the superior efficiency and economy of the private trader. Mr. Kirkham's analysis of the costs and overhead charges associated with installation work would attract considerable attention not only among their own members, but also among supply engineers. The author certainly demonstrated the very narrow margin that existed between success and failure, and his figures might be depended upon to explode the rumour that electrical contracting represented a short cut to considerable riches. He would support Mr. Miles's plea for a National Wiring Code. At the present moment there was a craze for cheap domestic wiring, but installations should be good and safe. He would like to see regulations forbidding the use of the cheap and shoddy wiring material employed in certain areas to-day, and would welcome the increased inspection of wiring work both in progress and after completion. In conclusion, he said that by bringing competitors within the organisation they would achieve a greater degree of equalised and healthy competition, and would promote the maximum possible degree of trade harmony and united effort for the common good.

*The constitution of the Committee was reported in the ELECTRICAL REVIEW of June 3rd (p. 890).

## Modern Installation Work.

(*Abstract of a paper by* R. GRIERSON, A.M.I.E.E., managing director, Grierson, Ltd.)

The full title of this paper was "Some Interesting Points in Connection with Modern Installation Work," and the contents did not belie the title. The author pointed out, as a commencement, that only by a united effort by all members of the Association could the proposals which he put forward be made effective. He suggested that the Association should draw up an agreed set of "Conditions of Sale with Erection" which would safeguard members' interests and stabilise and improve the general conditions of trading. This should include the following points:—

*Validity.*—Acceptance within 30 days or, in lieu thereof, confirmation at the date of acceptance.

*Drawings.*—Drawings covered for in the estimate, to be named.

*Extent of Contract.*—Details necessary to the execution of the contract, but excluded from the estimate, to be named, such as facilities for prompt and economical execution; adequate wall fixing for switchgear; cartage outside free delivery area; use of lifting tackle; free supply of fuel, &c., for testing purposes; accommodation for workmen within reasonable distance, &c.

*Provisional Sums.*—The manner of arriving at charges to be made against provisional sums should be clearly defined. The author considered that the only fair method was to charge work executed against those items at day-work rates.

*Insurance.*—While agreeing that the chances of the destruction of the work by war, civil commotion or fire were remote, Mr. Grierson thought that the contractor should cover himself by the insurance of material and *personnel*.

*Tests.*—The tests included in the contract should be clearly stated.

*Extra Costs.*—The contractor was penalised for delay in completing work; surely he should be compensated for the extra costs involved by the slowness of building contractors.

*Penalties.*—At present many contracts contained too-severe penalty clauses, sometimes amounting to as much as £100 per week on a £1,000 contract. A basis such as that contained in the I.E.E. "Model Form of General Conditions of Con-

tract" should be used. This provided for a percentage deduction from the contract price, with a maximum limit.

*Dates for Completion.*—Electrical contracting was a "following" trade, and due consideration should be given to delays caused by other contractors. Dates for completion should be accepted subject to a proviso that due facilities were given.

*Guarantee.*—Reference should be made to the period and the date of commencement and replacement restricted to repairing defects due to faulty design, material or workmanship. A suggested clause, operating for 12 months, excluded defects due to fair wear and tear; excessive condensation; corrosion due to the use of special plaster; the replacement of fuses and lamps; and faults occurring after work had been carried out by another person. Consequential loss and damage were also excluded, while the clause provided for the passing-on to the purchaser the benefit of any guarantee given by the makers of specialist equipment or material.

*Payment.*—The author asked if it were impossible for members to agree what were reasonable terms of payment; during what period the retention money should be held; and the amount to be so held.

*Day Work.*—The London Branch had endeavoured to standardise day-work rates in its area, and indications showed that the recommendations had been generally adopted. Unanimity was essential, as price cutting by one individual was used as a lever to force other members to accept lower prices.

*Schedule Rates.*—Certain trades had already agreed schedule rates for jobbing work. Those were, of course, minima, and where special circumstances arose, members were entitled to charge more.

*Prime Cost or Provisional Sums.*—The R.I.B.A.'s definition of prime cost prices or provisional sums excluded the contractor's profit, while the I.E.E. clause on the subject allowed for it upon the amount actually expended; the unexpended balance was deducted from the contract price. The I.E.E. clause was much fairer than that of the R.I.B.A., but the author preferred to see, in the absence of a definite supplementary estimate, that all work of that nature should be dealt with on a day-work basis, *i.e.*, the labour should be charged up at the E.C.A. rates for the district and materials charged up plus a fixed percentage. The "net cost" should be taken as the invoiced price to the contractor, the customer to have no interest in cash discounts, quantity rebates, &c.

*Measured Quantities.*—"The Scottish Mode for the Measurement of Electrical Work, 1918" (Stationery Office, 8d. net), was a useful document in contracting on a measured-quantities basis, and every member should obtain it. The author also quoted at length an article on the subject from an American paper which described the system as resolving "contracting to a buying and selling proposition." The principal attributes of the method were that it led to economy in physical and mental labour, fairness in competition, honesty, efficiency in design, harmony between the owner and contractor, and satisfactory progress through positive knowledge in ordering.

*Conditions of Contract.*—One of the most difficult aspects of modern installation work was the form of contract; apathy appeared to exist among sub-contractors of all trades on that point. At a recent meeting in London of the principal specialists an effort to obtain legal opinion of the drafting of a certain clause in a set of conditions of contract that was under review was strenuously opposed as too expensive. The annual value of contracts fixed on the "General Conditions" referred to was at least £2,000,000. An analysis of recent contracts showed that the specialists' work amounted to about 60 per cent. of the total contract price. No merchant or banker would look at such one-sided agreements as specialists, such as electrical engineers, signed without consideration. If all the E.C.A. members refused to sign any other form of contract than one approved by the Association's solicitor, the trading condition of the industry would be very considerably improved. At present a member would not refuse to enter into unfair agreements because he could not trust fellow members to do so. Dealing with the form issued by the Institute of Builders, Mr. Grierson said that the first paragraph called upon the sub-contractor to perform all his obligations to the satisfaction of the contractor and architect. Here, the author thought the word "reasonable" might have been inserted before "satisfaction." Another paragraph provided for the termination of a contract and reserved power to act to the contractor. As nominated sub-contractors, the question of termination of electrical contracts should be in the hands of the architect. Then it was required that all orders should be given and confirmed by the builder. There, again, if the architect ordered the work and certified for payment to the builder, that stipulation was undesirable. The contractor should give all his sub-contractors seven days' notice of his intention to apply for a certificate on account and request that details of the sub-contractors' claims be sent to him by return of post; a maximum period of seven days should be provided for payment to the sub-contractors after the builder had received payment; it should be laid down that the maintenance period commenced from the day on which the installation was ready for beneficial use; and a clause should be incorporated providing that payment could be payment direct to the sub-contractor by the client in the event of delay. The Institute of Builders' form required the sub-contractor to accept risks which were not legally his. He should only be responsible for his plant and tools and his own workmen. It might be stipulated that the sub-contractor should indemnify the contractor against claims by the sub-contractors' workmen except where accidents were due to the negligence of the contractor or his agents.

*Indirect Payment.*—The sub-contractor should see that the principal contract under which he was working was the revised R.I.B.A. form, which included a clause permitting the architect to issue sub-contractors' certificates direct on the employer, in the event of the contractor's failure to issue them. The author considered that that clause should be compulsory on the architect and not merely permissive.

*Delay in Completion.*—A difficult question was the responsibility for cost incurred in delay in completion due to circumstances beyond the control of the sub-contractor. A contract might provide for the completion of work in six months, but on account of various reasons, three years might elapse before the work was finished. How was the sub-contractor to obtain repayment of the additional costs involved for supervision and other purposes? The architect might refuse to certify, as he could well say that the client required possession at the date specified, and the builder would refuse to pay as the architect had not certified. Presumably it was a business risk that must be carried.

*Trade and Builders' Discount.*—It was desirable that members should arrive at some agreement regarding discount to builders on contract work, and also work done for re-sale. Regarding the former, it appeared desirable to quote two prices, e.g., "If paid direct, £1,000," or "If paid through the builder, £1,030." The client then knew what he was paying for the builder's services, and it remained for him to decide whether the indirect method was worth the 3 per cent. added in order to allow 2½ per cent. discount. The other aspect of discount was one with which members were not infrequently called upon to deal, *i.e.*, genuine trade discount for re-sale. For example, temporary lighting of works during construction would be paid for by a builder, to be re-charged to the client. Should the work be charged for at standard day-work rates, or at something less to allow the intermediate employer some margin of profit and to enable him to recharge the purchaser at standard rates?

In conclusion, the author repeated that the remedy for the difficulties referred to lay in the members' own hands. If the general principles put forward were approved, members should go to their local branches and ask for representations to be made to headquarters for those matters to be dealt with. Unless members were "One hundred per cent." loyal to the Association, conditions could not be stabilised, and they would probably degenerate. He realised the difficult position of the builders. They were instructed by the architects to place the work with certain electrical contractors, and the latter usually took their instructions from the architects, and it was only when difficulties arose that the builders came into the picture and were reminded of their responsibilities. He felt that builders and electrical installation contractors had much in common, and closer co-operation would be to their mutual advantage.

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### Discussion.

The discussion which ensued was opened by Mr. W. F. FURSE, who said that electrical contractors should aim at becoming main contractors and deal directly with the architect rather than the builder. Conditions could be discussed with greater prospect of success with the architect or consulting engineer. He thought that if that were brought about, the I.E.E. Model Conditions would be suitable for their use. Those conditions had already been adopted in a case in which the contractor passed by the builder and negotiated with the architect. The speaker quoted a case in which a builder had ordered electrical fittings, allowing the contractor 10 per cent.; the contractor had discovered that he was not bound to accept fittings which he had not directly ordered. Government contractors had found that specifications issued in the form of bills of quantities were costly. The jobs often required more material than was specified.

Mr. W. R. RAWLINGS considered that the author had dealt with the subject from a selfish point of view. Contracts should be the result of agreement between the parties concerned. Contractors should not oppose strength with strength, but by discussion and consideration evolve a form of contract which would be acceptable to all parties. Some provision should be made for the cost of tendering, which could prove quite an expensive item. Often a £200 or £300 job could not produce a tenth of the profit necessary to cover the cost of the estimates. It was unfair to include a sum to be distributed to unsuccessful tenderers, but if a client wanted a large number of estimates he should be prepared to pay for them. If payment was to be made, the number of estimates called for would be reduced. An indirect payment clause was desirable, for losses often arose from the failure of the main contractor. In conclusion, he thought that the ventilation of the subject was valuable, but the wrong method of approach had been adopted.

Mr. W. CROSS said that although he did not read the implication into the paper at first, he was inclined to agree with Mr. Rawlings that the paper did not deal with the matter in the right spirit. The E.C.A. had already published

some general conditions of contract; those were to be regarded as a model, and not rules to be forced upon members. It was very difficult for the Council to persuade members to adopt methods of working which were considered to be to their advantage. His own firm felt that some of the clauses in the E.C.A. conditions could be shortened with advantage. If all members tendered under the same conditions, fairness and equality of opportunity would be assured. In drawing up a contract care should be taken that all matters included in the work were covered. With regard to insurance of work in progress, the latter should be certainly covered for fire risk, and the cost was very slight. The question of consequential damages and third-party risks was being examined by the Association's Law and Parliamentary Committee, and a statement would no doubt be made shortly. A clause was certainly necessary whereby the contractor could claim the additional costs to him which were involved by the delay of other people concerned in a job. Dealing with guarantees, Mr. Cross thought that it was necessary for electrical contractors to be very generous in that respect. A clause in the E.C.A. model conditions provided that work should cease on a job until specified payments on account were made. The Northern Section used a jobbing price list for work under the value of £5, and customers were generally content to accept it as evidence of the rate charged being fair. There was a difference of opinion among architects as to the meaning of prime-cost sum in the R.I.B.A. conditions. Some thought that it meant the manufacturer's price, some took it as the list price, while others agreed to the addition of 10 per cent. to the manufacturer's price. The matter was one which should be definitely settled. Quantity surveying was not always satisfactory, and his firm preferred the price-per-point system. Another question which required a decision was that of builders' discount. Concluding, the speaker said that diversity of conditions was the problem presented. The E.C.A. was attacking the matter, and called for its members' views and assistance.

Alderman R. TWEEDY SMITH (solicitor to the Associations), referred to the drawing up of the E.C.A. model conditions in 1902, and said that the aim was to obtain something similar to the arrangements which were used in house purchasing, *i.e.*, so that it would be sufficient to state "E.C.A. conditions to apply" and settle the whole matter. If a specification did not say anything about insurance while the subsequent contract covered consequential damage the contractor was legally entitled to object. Contractors would not take the trouble to see that they signed only to the points actually in the contract. If at the time of signing they wrote a letter setting out their construction of the clauses they would cover themselves. Such a letter could deal with the lack of facilities for carrying out the work and other important points. Contractors should not try to stand up to architects themselves; they should call upon the Association's representative to argue their case, and that would prevent the occurrence of personal friction. He urged members to beware of the contract which said that if the architect had omitted anything, or if the quantities were incorrect the responsibility lay with the contractor. Such a contract was immoral, and the Court of Appeal had on one occasion held it to be wrong.

Mr. H. Moss suggested that meetings of the branches should be called (for the benefit of who were not present) to discuss the conference papers. Proceeding, he said that the contractors did not want to adopt a fighting attitude to obtain their dues, but they might be forced to do so. Referring to the provisional sum, he maintained that it should be the amount which was to be paid by the buyer, and should include a reasonable profit. Other points made by the speaker were that extra expenses caused by delay due to unforeseen circumstances should be paid, and that interest should be allowed on overdue payments on account. A model form of contract satisfactory to both contractor and client was very necessary, but unless such a form was adopted by all members it would be ineffective. Finally, he said that architects' specifications were sometimes ridiculous, and often the very low tenderers were not kept strictly to the specification.

Mr. W. FINLAY (solicitor to the E.C.A. of Scotland) dealt with the Scottish mode of measurement which Mr. Grierson had mentioned, and said that it did not stipulate that everything should be measured. He claimed that the Scottish mode (or code) was much in advance of the E.C.A. conditions; among other things it defined prime cost as the net cost to the contractor excluding special cash discounts which he might earn. Moreover, the architect was required to provide for the contractor's profit on prime cost. Some commercial men, said Mr. Finlay, would sign contracts which bound them hand and foot and hope for the best. That was not due to interest in the work, but to foolish asininity. What gave the Scottish code force was that it was drawn up and approved by a gathering of architects, consulting engineers, contractors, and others. Government departments were represented, and the code had virtually become an official document. It was practically law in Scotland.

Mr. GRIERSON briefly replied to the questions raised in the discussion. He said that he was not bellicose; all he wanted was the adoption of conditions to avoid discussion and uncertainty. There were already six sets of conditions to choose from, but none of those satisfied the conditions. As to one-sidedness, the Institute of Builders had not consulted contractors in drawing up its rules. He wanted to remove the one-sidedness which was exemplified by such contracts as that. The form which he had in mind was a single form which would satisfy all parties. He did not think that electrical contractors could become main contractors; architects could not deal with some twenty sub-contractors on that basis; they preferred to let the builder do it. Probably the I.E.E. conditions could be amended to suit installation contracting work; at present they dealt principally with the installation of heavy plant, and were far too long for the purpose. In dealing with bills of quantity it should be made clear that any variations should be dealt with on the basis of 10 per cent. Mr. Grierson considered that while the E.C.A. conditions were suitable for the wiring of a single house, they were not applicable to very large installations. Mr. Cross had said that his firm had not adopted the conditions *in toto*; that was a position which he wished to see remedied by the production of an agreed form. In his opinion prime cost was the invoice value, but the provisional sum was the selling value. The writing of letters as suggested by Ald. Tweedy Smith would be unnecessary if proper conditions of contract were available. In respect of variations in the work, Mr. Grierson said that if an order was signed by the master of works payment would be made for the work.

# Electrified Homes.

BY the courtesy of the author—Mr. H. H. Berry—of the paper on "The Electrified Homes of Great Britain," which he read at the I.M.E.A. Convention, we are enabled to give a summary of his reply to the discussion which followed it, and of which a report appeared in our issue of June 17th:—

Mr. L. L. Robinson tells us that for many years he lived in an all-electric flat, but at present lives in a neighbourhood where current is not cheap. He probably fulfilled all the conditions which permit of an all-electric home as quoted on page 10 in the author's paper, although to attain that high ideal it is only necessary to qualify for the first two, namely,

(1) A low price charge for electricity.

(2) A condition of living which requires an intermittent as distinct from a constant supply of heat energy.

Mr. Robinson suggested a system which employs the burning of hard coal in the winter for the mass production of hot water and the use of electricity during the summer months. This is the "Colectric System" in a more costly form.

Lady Brooks called attention to the necessity of co-operation with the architect and the builder. This is, in the author's opinion, a matter worthy of the attention of the E.D.A.

While we rely upon coal as our basic fuel for the production of electrical energy, it seems in the author's opinion a ridiculous quibble to demand that it shall *all* be consumed at a few selected spots, if it can be proved that by a better distribution of the basic fuel an increased domestic electric load, which the Commissioners assess at approximately 1,000 per cent., is to be obtained immediately at prices which are satisfactory.

Dr. S. Z. de FERRANTI said he did not like compromised systems, and then proceeded to explain a compromised system which he had recently installed in his own home, where hot-water pipes were laid in the ceilings for room warming by heat which was not obtained from electricity; then he uses electricity for the topping-up balance of 25 per cent. Dr. Ferranti suggested that the "Colectric System" was a makeshift (a sort of half-way house) and decried the use of a system which, he suggested, made it possible to be poisoned by gas fumes. What does Dr. Ferranti offer us as an alternative? The hope that some day we shall be able to buy 57 per cent. of our electricity in comparatively small quantities at a farthing a unit or less: for that is the price needed to begin to compete with the "Colectric System."

The author could quote the name of a firm which has installed tens of thousands of kilowatts of electrical apparatus to be used on the "Colectric System" where there is no satisfactory electrical alternative.

Station engineers and contractors will not be content to leave this 1,000 per cent. load increase haphazard to the architect. The author believes that the parties, working together under the Agreed Clause in the Electricity Act, will formulate a programme for development to take full advantage of this particular opportunity.

Several speakers had the impression that the "Colectric System" would increase the capital cost of the apparatus used in workers' homes as compared with an all-electric home; that is not correct. Both the capital outlay and the running costs are reduced on the "Colectric" plan, and a wider field of operation is immediately opened up. Other speakers seemed to think that the "Colectric System" only applies to new buildings, but that is not so.

Flats for working men and women on the "Colectric" plan will provide a greater degree of comfort at less cost. The Mayor of an East London borough, who has a great housing scheme, informed the author that he concurred entirely with that view.

In conclusion, the author pays a special tribute to the high quality of the ladies' speeches, and in particular to their constructive criticism.

# Australian Imports and Exports.

## Values for 1924-25 and 1925-26 Compared.

THE following figures showing the values of the imports of electrical goods into Australia in the fiscal year 1925-26 have been taken from the recently-issued official trade returns. The corresponding figures for the previous twelve months have been added for purposes of comparison and notes of increases or decreases given. There is a brief reference also to Australia's electrical exports at the end of the article.

### Imports.

| | 1924-25. £ | 1925-26. £ | Inc. or dec. £ |
|---|---|---|---|
| *Cable and wire, covered with cotton—* | | | |
| Total | 24,000 | 20,000 | − 4,000 |
| From United Kingdom | 22,000 | 19,000 | − 3,000 |
| ,, Holland | 1,000 | — | − 1,000 |
| ,, United States | 250 | 500 | + 250 |
| *Telegraph and telephone cable, paper-insulated, lead-covered—* | | | |
| Total, mainly from United Kingdom | 179,000 | 31,000 | −148,000 |
| *Other telegraph and telephone cable—* | | | |
| Total | 1,125,000 | 1,383,000 | +258,000 |
| From United Kingdom | 1,080,000 | 1,327,000 | +247,000 |
| ,, Holland | 16,000 | 13,000 | − 3,000 |
| ,, United States | 27,000 | 39,000 | + 12,000 |
| *Carbon manufactures—* | | | |
| Total | 25,000 | 27,000 | + 2,000 |
| From United Kingdom | 12,000 | 10,000 | − 2,000 |
| ,, United States | 8,000 | 10,000 | + 2,000 |
| ,, Germany | 2,000 | 4,000 | + 2,000 |
| *Dynamo-electric machines—* | | | |
| Total | 1,038,000 | 1,040,000 | + 2,000 |
| From United Kingdom | 791,000 | 754,000 | − 37,000 |
| ,, Canada | 7,000 | 8,000 | + 1,000 |
| ,, Germany | 14,000 | 28,000 | + 14,000 |
| ,, Holland | 11,000 | 10,000 | − 1,000 |
| ,, Sweden | 12,000 | 25,000 | + 13,000 |
| ,, United States | 178,000 | 186,000 | + 8,000 |
| ,, Switzerland | 13,000 | 18,000 | + 5,000 |
| *Fans, electric—* | | | |
| Total | 35,000 | 37,000 | + 2,000 |
| From United Kingdom | 11,000 | 12,000 | + 1,000 |
| ,, Italy | 11,000 | 10,000 | − 1,000 |
| ,, United States | 11,000 | 14,000 | + 3,000 |
| *Switches, fuses and lightning arrestors—* | | | |
| Total | 345,000 | 302,000 | − 43,000 |
| From United Kingdom | 213,000 | 200,000 | − 13,000 |
| ,, Japan | 2,000 | 200 | − 1,800 |
| ,, United States | 121,000 | 93,000 | − 28,000 |
| ,, Germany | 3,600 | 2,500 | − 1,100 |
| *Heating and cooking appliances—* | | | |
| Total | 39,000 | 53,500 | + 14,500 |
| From United Kingdom | 12,000 | 15,000 | + 3,000 |
| ,, Canada | 3,600 | 5,250 | + 1,650 |
| ,, United States | 20,000 | 31,000 | + 11,000 |
| *Lamps, filament—* | | | |
| Total | 409,000 | 484,000 | + 75,000 |
| From United Kingdom | 191,000 | 232,000 | + 41,000 |
| ,, Hungary | 5,000 | 5,000 | — |
| ,, Austria | 6,000 | 20,000 | + 14,000 |
| ,, Holland | 155,000 | 155,000 | — |
| ,, United States | 39,000 | 47,000 | + 8,000 |
| *Measuring and recording instruments—* | | | |
| Total | 201,000 | 160,000 | − 41,000 |
| From United Kingdom | 102,000 | 81,000 | − 21,000 |
| ,, Switzerland | 36,000 | 24,000 | − 12,000 |
| ,, United States | 55,000 | 35,000 | − 20,000 |
| ,, Canada | 500 | 12,000 | + 11,500 |
| *Regulating and controlling apparatus—* | | | |
| Total | 283,000 | 246,000 | − 37,000 |
| From United Kingdom | 158,000 | 149,000 | − 9,000 |
| ,, United States | 108,000 | 82,000 | − 26,000 |
| ,, Switzerland | 8,000 | 9,000 | + 1,000 |
| *Static transformers and induction coils—* | | | |
| Total | 259,000 | 193,000 | − 66,000 |
| From United Kingdom | 178,000 | 111,000 | − 67,000 |
| ,, Sweden | 600 | 27,000 | + 26,400 |
| ,, United States | 75,000 | 44,000 | − 31,000 |
| *Telegraph instruments and appliances—* | | | |
| Total | 54,000 | 26,000 | − 28,000 |
| From United Kingdom | 32,000 | 18,000 | − 14,000 |
| ,, United States | 22,000 | 7,000 | − 15,000 |
| *Telephones—* | | | |
| Total | 409,000 | 375,000 | − 34,000 |
| From United Kingdom | 265,000 | 245,000 | − 20,000 |
| ,, Sweden | 2,000 | 4,500 | + 2,500 |
| ,, United States | 117,000 | 113,500 | − 3,500 |
| ,, Czecho-Slovakia | 4,000 | — | − 4,000 |
| ,, France | 10,000 | 7,000 | − 3,000 |
| ,, Germany | 4,000 | 2,500 | − 1,500 |
| *Telephone switchboards and appliances—* | | | |
| Total | 554,000 | 807,000 | +253,000 |
| From United Kingdom | 360,000 | 380,000 | + 20,000 |
| ,, Belgium | 12,000 | 29,000 | + 17,000 |
| ,, Sweden | 10,000 | 23,000 | + 13,000 |
| ,, United States | 168,000 | 373,000 | +205,000 |
| *Vacuum tubes—* | | | |
| Total | 150,000 | 142,000 | − 8,000 |
| From United Kingdom | 60,000 | 42,000 | − 18,000 |
| ,, Holland | 32,000 | 26,000 | − 6,000 |
| ,, United States | 56,000 | 65,000 | + 9,000 |
| *Electrical appliances, n.e.i.—* | | | |
| Total | 1,152,000 | 500,000 | −652,000 |
| From United Kingdom | 675,000 | 289,000 | −386,000 |
| ,, Canada | 11,000 | 7,500 | − 3,500 |
| ,, Denmark | 17,000 | 6,500 | − 10,500 |
| ,, Germany | 19,000 | 17,000 | − 2,000 |
| ,, Japan | 8,000 | 1,500 | − 6,500 |
| ,, United States | 399,000 | 170,000 | −229,000 |
| ,, Switzerland | 9,000 | 300 | − 8,700 |

### Exports.

Australia carries on a small export trade in electrical goods of her own manufacture. Below are given the comparative values in 1925-26 and 1924-25.

| | 1924-25. £ | 1925-26. £ | Inc. or dec. £ |
|---|---|---|---|
| *Electrical materials, other than machinery and appliances—* | | | |
| Total | 26,000 | 29,000 | + 3,000 |
| To New Zealand | 18,000 | 23,000 | + 5,000 |
| *Electrical machinery and appliances—* | | | |
| Total | 38,000 | 21,000 | − 17,000 |
| To New Zealand | 35,000 | 15,000 | − 20,000 |
| ,, Fiji | 500 | 750 | + 250 |
| ,, New Guinea | — | 500 | + 500 |

### Australian Demand for Increased Duties on Batteries.

The *Sydney Morning Herald* reports the continuation of the inquiry of the Australian Tariff Board into applications for increases in the import duties upon secondary batteries (*vide* our last issue, p. 1014). Strenuous opposition was offered to the proposals by representatives of British battery makers. It was stated that if the increases were granted the Australian public would suffer, because it was admitted that the improved efficiency of the Australian battery resulted from the necessity of meeting the competition of the larger overseas manufacturers. The new duties would mean prohibition rather than protection, and it would not be possible for representatives of British factories and Australian distributors to continue trading. Competition for radio and automobile batteries was already very keen and, even under the existing duties, British firms were under-quoted by Australian manufacturers, and their share of the trade was continually diminishing. Another witness opposed the application on the ground that the present duties, plus natural protection, were more than sufficient for the needs of the industry. The hearing was adjourned for evidence to be taken in Melbourne.

# An Electric Kiln.

**A production of Messrs. Automatic and Electric Furnaces, Ltd., for the manufacture of stained-glass church windows, from which some interesting results have been obtained on a twelve-month's working.**

WHAT is believed to be the first electric furnace or kiln of its kind to be manufactured and installed, at any rate in this country, is the Wild-Barfield electric kiln which has been developed at the premises of Mr. A. K. Nicholson, London, by Messrs. Automatic and Electric Furnaces, Ltd., for use in the production of stained-glass church windows.

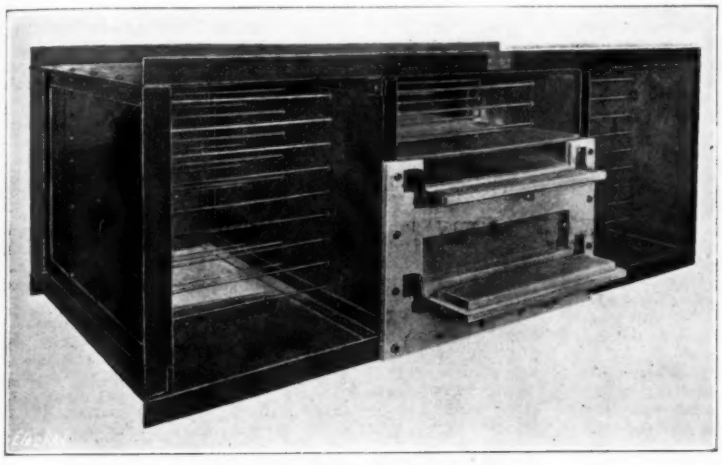

Fig. 1.—Original Kiln in its Present Form.

The apparatus in its original form was installed some two years back, the requirements of the industry having been outlined to the makers, and it has since been perfected on the site until it now meets the exacting demands of the kilnman in a most successful manner.

Prior to the installation of the electrical apparatus the work was done in a gas kiln, and the comparative results which have been obtained for two separate year's workings, one gas and one electric, the selected years being periods of equal production, are quite striking. The electricity and gas charges for the two periods were in the ratio of 3 to 5. Furthermore, the new kiln has resulted in much more comfortable working for the kilnman, and also in a considerable improvement in the finished products.

The first essential for stained-glass manufacture is great facility for accurate and immediate variations of temperature between 800 and 950 deg. C. This has been successfully achieved by means of a specially designed rheostat in the heating circuit.

Fig. 1 shows the kiln as it is now. It consists of a central two-compartment oven constructed of metal plate, with side and top auxiliary warming chambers. The bottom portion of the oven is equipped with top and bottom heating. Nickel-chrome elements are employed, and are totally enclosed in special core bricks, 4 in. by 8 in., through which the spirals are threaded, and which form the oven lining. The loading is 10 kW.

The interior dimensions of the bottom and top portions are 32 by 20 by 4 in. and 32 by 20 by 2 in., respectively. The glass is treated in trays, accommodation being provided for two of these in the bottom and one in the top chamber.

It will be seen that the combination of the oven and the auxiliary chambers offers a wide range of temperature in itself. It is for the kilnman to arrange the "travel" of the trays progressively through the compartments, finally reaching the maximum temperature in the bottom section of the oven.

The whole is constructed on an angle-steel framework, 5 ft. 10 in. long by 2 ft. 3 in. deep and 3 ft. wide.

The oven is equipped with a silver fuse in a silica tube, which "blows" and lights up a pilot lamp when the oven temperature reaches 960 deg. C.

Fig. 2 shows a second kiln which has been installed by the makers at the works of the Misses Townshend, London. It is the outcome of the work that has been done on the first installation, and is likely, we understand, to be adopted as a standard equipment for manufacture. In this particular case the kiln is not supplied with the side warming chambers.

It is designed to give a working temperature of 800 deg. C. on a total loading of 6 kW. The Wild-Barfield totally enclosed elements are arranged along the whole length of the sides and top of the lower or main heating chamber. The upper compartment utilises the waste heat from the lower one.

The kiln is designed to take a standard glass tray measuring 14 by 20 in.

It should be mentioned that credit is due to Mr. Nicholson, who, we understand, gave every facility to the makers for the development of the apparatus on his premises, even at the expense of considerable time and money, and also to Mr. James Royce, an assistant in Mr. Nicholson's studio, who, we are informed, was responsible for the initial design of the kiln and for much of the work entailed in developing the apparatus to its present stage of efficiency. To convince his chief that the installation of electrical apparatus was a practical and commercial proposition, Mr. Royce built a small model of sheet-iron.

It is interesting to note that the supply for Mr. Nicholson's apparatus is obtained from the St. Pancras electricity undertaking at 1d. per kWh.

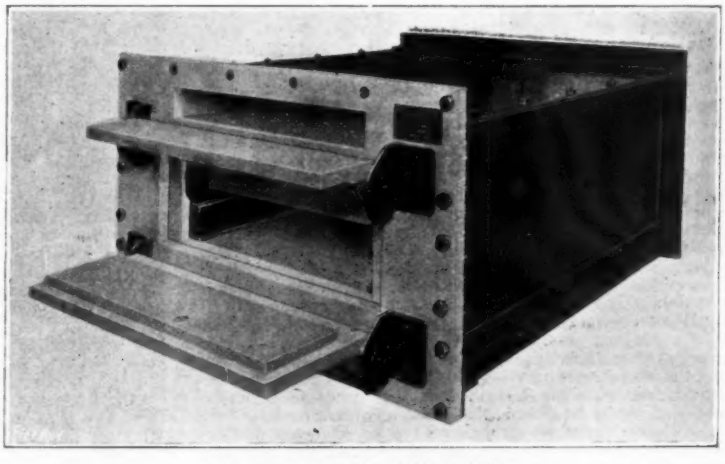

Fig. 2.—"Standard" Wild-Barfield Kiln.

### A New Type of Primary Cell.

In a letter to *Nature*, Mr. D. R. Barber, of University College, Exeter, describes a two-fluid "oxidation" cell recently constructed by him. Zinc, in a saturated solution of ammonium sulphate, and carbon, in an acidified solution of potassium permanganate, form the constituents. In order to maintain the permanganate solution saturated, a layer of the crushed salt is placed at the bottom of the containing vessel. This cell has an e.m.f. of 2.16 volts, with an internal resistance of 0.5 ohm approximately, for currents varying from 0.6 to 0.2 ampere. On a simple test, with continuous discharge for twenty hours, the output remained constant for eight hours at 0.3 ampere, afterwards decreasing to 0.2 ampere. At the conclusion of the test the initial e.m.f. was quickly reached. Practically no polarisation occurs, and the amount of zinc dissolved is inappreciable. The cell, says Mr. Barber, possesses many advantages over the Daniell elements used in laboratories, and should prove useful, in a modified form, as a source of high-pressure supply in wireless work.

# Large Circuit-Breaker Tests.

**Some valuable conclusions resulting from a large number of tests on several types of oil-immersed high- and low-voltage circuit breakers.**

AT the Winter Convention of the American Institute of Electrical Engineers, Messrs. P. Sporn and H. P. St. Clair, both of the American Gas & Electric Co., which conducted the investigation, described the results of a large number of tests on high- and low-voltage oil-immersed circuit breakers of large rupturing capacity.

1. The first group of tests was brought about by the purchase from the Brown-Boveri Co. of a number of type AF24/IA 150-kV and 35-kV breakers, the acceptance of which was made conditional upon the results of rupturing capacity tests; the 150-kV breaker was of the round tank multiple-break type equipped with oil-filled 150-kV bushings; a total of 10 breaks per pole was employed with simple ball type butt contacts.

Although it was not possible to obtain sufficient short-circuit current at any point on the interconnected 132-kV system of the company to test the breaker at its full rated interrupting capacity of 1,500,000 kVA, it was felt, nevertheless, that a series of tests at the maximum capacity available, approximately 750,000 kVA, would indicate whether the breaker would be acceptable for the intended service.

The 35-kV breaker was of the plain break AF12/36 type, two breaks per pole, with all three poles in one rectangular tank; several had been purchased subject to the results of tests to be made at 22 kV (the only voltage of that class available at the Sunnyside sub-station) and carried to the full breaker rating of 250,000 kVA.

2. The second group of tests, conducted at Schenectady with the regular testing equipment of the General Electric Co. was made on one unit of Reyrolle compound-filled switchgear, type C-1-ORD, rated at 7,000 volts, 400 amperes, and having a guaranteed rupturing capacity of 75,000 kVA; short-circuit tests were made, first, at 2,300 volts, beginning with less than rated duty, and carried to a point considerably beyond the rating, and later at 6,600 volts at more than full rating.

3. The third group of tests was made on two of the General Electric Co.'s 132-kV breakers, one of them an FHKO-39-B and the other an FHKO-136-B. The former had a rated rupturing capacity of 1,250,000 kVA, and was of the round tank, explosion chamber type; the other was rated at 750,000 kVA, and was of the oval tank explosion chamber type. The breaker tanks were grounded to separate pipes driven near the tanks and not tied in with the short-circuit ground.

Prof. H. E. Dyche, assisted by Prof. E. R. Rath, both of the University of Pittsburgh, took oscillographic records and furnished the necessary equipment; he added to an original Siemens and Halske oscillograph a number of automatic features to make it possible to start the film at an exact predetermined time delay after the actual closing of the test breaker control circuit, and to automatically stop the film after a predetermined travel. This feature made it possible to record as many as four shots on one film without reloading the instrument, even though the shots were made in rapid succession. Complete results of all tests, including data on the system set-up, are summarised in the paper.

*Brown-Boveri 150-kV Breaker Tests.*—Beginning with a standard duty cycle of 2-o.c.o.* shots with a two-minute interval and a system calculated to give approximately 225,000 kVA, the duty on this breaker was increased by steps until the full system capacity available was applied. The series of eight shots comprising tests 6 to 13, inclusive, presented an unusual and interesting test in that they were as rapid as the breaker could be closed, the interval averaging approximately 10 seconds, and the short-circuit opened averaged 330,000 kVA, or one-fourth of the rated capacity of the breaker. Considerable trouble was experienced in recording the two currents on the oscillograph, apparently due to stray currents in the secondary leads. The difficulty was not overcome until an entirely separate ground, consisting of a single ground pipe, had been made and the test current transformers completely isolated from the station ground. Tests 14 and 15 represented a short circuit of 525,000 kVA; burning of the contacts was seen when they were removed for inspection, and oil samples taken at this time showed slightly more discoloration than those taken after test 5, but the oil was in very good condition and tested an average of 24 kV. In an attempt to obtain a record of the internal pressure on this breaker during the tests, engine type indicators connected to the tanks were very inadequate, but as nearly as could be determined they registered approximately 10 lb. per sq. in. on all tests. The contacts were removed and dressed and fresh oil supplied to the breaker: on test 17, with 700,000 kVA, No. 1 pole gave off considerable smoke and threw a small quantity of oil from the vent, indicating more distress than on any of the other shots during the entire series; nine shots at full system capacity were applied after this test without any repetition of this apparent distress, so that the reason for it on this shot is not at all clear. The barrier between the individual breaks in tank No. 1 after the completion of the tests showed that one of them had been somewhat charred on both sides opposite the breaks; it was of a material different from that furnished with the original breaker, as it had been obtained locally to replace one of the originals which had become broken in assembly. Subsequent examination failed to reveal any puncture, however, so that the distress shown is still unexplained unless it was simply due to the generation of more than the usual amount of gas and smoke caused by the burning of this barrier. A final series of 7-o.c.o. shots at one-minute intervals was applied, and on all of the shots at the higher values of kVA considerable movement of the tanks was observable, due, it is believed, at least partly, to the resilient character of the timber foundations. After test 26, although considerably burned, there was nothing in the condition of the contacts which would prevent the breaker from continuing in service even without any dressing of the contacts. The oil was considerably discoloured, but tested an average of 25 kV, compared with 30 kV for the fresh oil supplied to the breaker before test 16.

*Brown-Boveri 35-kV Breaker Tests.*—The breaker was connected temporarily to one 22-kV circuit with two 132-kV lines and two transformer banks in service. The contacts on this breaker were of the plain break type with spring-mounted arcing contacts, and all three poles were placed in one rectangular tank and separated only by internal barriers. The planned series of tests was carried out, however, only to the extent of the first shot, as this resulted in failure, accompanied by the oil catching fire; due to a mishap on the oscillograph, no record was obtained of the current and voltage values on this shot, but calculation indicates that the short circuit was probably in the neighbourhood of 190,000 kVA. The cover casting was broken and the rivets which held the tank to the angle-iron ring at the top were sheared off, allowing the tank to drop; the arcing at the exposed contacts turned into a short circuit, igniting the oil and causing the back-up breaker to open; the lower half of one of the bushings was stripped of porcelain by the arc, and the interior tank lining and barriers were displaced. It was definitely determined that the breaker was not up to its rating.

*Reyrolle 7,000-Volt Breaker Tests.*—The Reyrolle armour-clad compound-filled switchgear, the circuit breaker portion of which was tested with the results given below, was purchased subject to the guaranteed rupturing capacity of 75,000 kVA at 2,300 volts. On the first duty cycle at 2,300 volts, in which the breaker opened 39,200 kVA, no distress was evident beyond the hissing sound of escaping oil and gas. The second duty cycle on which 58,000 and 45,700 kVA, respectively, were obtained on the two shots, was handled by the breaker apparently as easily as the first. Upon lowering the tank, however, it was found that the wooden barriers separating the three poles were broken from their fastenings and displaced, the screws fastening these barriers to the tank lining at the side and at the bottom having been torn out of the wood; also considerable burning was disclosed on this test, both on the arcing contacts and somewhat on the main contacts. On the final duty cycle at 2,300 volts the breaker successfully cleared a short circuit of 100,000 kVA on the first shot and 64,300 kVA on the second shot; before these two tests were made the wooden barriers, found broken after the last test, were repaired and replaced, and new oil was supplied to the breaker, but were again found completely broken from their fastenings and displaced; as before, the arcing contacts, both upper and lower, were quite badly burned, and considerable burning was also evident both on the upper main contacts and on the lower contact bar. Before proceeding with the test at 6,600 volts new arcing contacts were installed and the main contacts were carefully dressed, new wooden baffles were inserted and new oil was supplied.

Based on a duration of short circuit of seven or eight cycles for which it was intended that the time delay relay should be set, the generator circuits were arranged to give a calculated value of 75,000 kVA for test 7. For some unknown reason the short circuit lasted only 2½ cycles instead of seven or eight, and the breaker attempted to open 122,000 kVA. The oscillogram bears evidence that the short circuit was actually cleared for a period of seven cycles, after which complete failure took place; apparently the breaker cleared the short circuit, but the gas pressure was so great that the tank was completely ruptured, one side being thrown against the exposed 6,600-volt temporary terminals underneath the current transformer chamber, causing a short circuit which immediately set fire to the oil. The force of the explosion was so great that the tank was split, not only

* "Open-close-open."

along the welded seams, but on two edges where the steel had been bent, but not welded. The rupturing capacity of this switch was exceeded by more than 60 per cent. on test 7, at which value the result obtained might well have been expected. On test 5, on the other hand, the breaker successfully opened 100,000 kVA at 2,300 volts, which, aside from the breaking of the barriers and rather extensive burning of the arcing contacts (the contacts tested were not designed for 2,300-volt service), ought certainly to be considered a creditable performance.

Although the breaker more than met its guaranteed rupturing capacity, certain design features which were standard with the manufacturers on breakers of heavy duty were incorporated in the breaker actually installed, the principal ones being those of increasing the thickness of the tank from ¼ in. to 5/16th in., increasing the depth of the tank 2 in., and the substitution of a much heavier butt-type arcing contact and the employment of steel barriers over which is placed a wooden lining instead of wooden barriers fastened to the tank lining. The authors have no doubt but that the breaker as finally obtained has a rupturing capacity considerably in excess of the originally guaranteed capacity.

*General Electric 132-kV Breaker Tests.*—Arrangements for the test included tapping the line at the first tower, the same as for the Brown-Boveri 132-kV test, through the FHKO-39-B and FHKO-136-B breakers connected in series to the short-circuit point. All of the shots were cleared by the test breaker with no evidence of distress, with no throwing of oil, and with very little smoke visible, except on test 17, when No. 3 tank gave off quite a puff of smoke; however, inspection following the completion of the tests did not reveal any unusual condition, or anything different from that in the other two tanks.

At the conclusion of the tests the oil was immediately drained from the tanks and the contacts from phase 3, which had given off the puff of smoke, were removed: it was found that the burning was confined almost entirely to the arcing ring below the current-carrying segments and that the burning of the rod was confined to the arcing tip, and was such that no beads or pits were left which might cause the rod to stick in the contacts. It was quite evident that the contacts were in sufficiently good condition, so that without any dressing at all the breaker could be kept in service and carry its rated current even though 26 short circuits had been interrupted, 17 of them at full system capacity.

Tests on the FHKO-136B 132-kV breaker were made, as previously mentioned, in series with the 39B, the latter being used as a back-up breaker. After subjecting the breaker to a trial shot and three of the proposed series of eight shots at approximately one-fourth rating, the breaker failed by splitting open along the welded seam at the bottom of the middle tank, permitting the oil in that tank to escape; one of the insulating cylinders normally surrounding the explosion chambers had broken from its fastenings and was lodged on the crosshead. The other insulating cylinder on this pole had not fallen down, but was partially broken from its fastening; it was apparent also that the explosion chamber insulation had failed, permitting the arc to cut through the throat bushing to the lower edge of the steel explosion chamber, which itself showed marks of the arcing on the inside edge of the bottom opening. The contacts taken from this breaker indicated by the small amount of pitting that the actual short-circuit duty was very light. The tanks were returned to the factory, a stronger weld being employed, and new types of throat bushings slightly different in design and of new material, supposedly stronger from a mechanical and electrical standpoint, were also supplied. The breaker, embodying these changes, but no others, was submitted to a second series of tests, which proved to be almost an exact repetition of the results obtained on the previous series.

The final explanation adopted as the reason for the failures was as follows: The fairly long insulated cylinder placed over each explosion chamber was supported only and entirely at the bottom, partly by means of a number of fibre screws tapped into the bottom of the steel explosion chamber and partly by the explosion chamber throat itself. When the breaker opened on short circuit the generation of gas caused some internal pressure, throwing oil against the flat sides of the tank and springing these sides out to a certain extent; on the rebound the oil thrust against the insulating cylinders over the explosion chambers. Since these long insulating tubes were supported only at the bottom, the cantilever strength was insufficient to withstand this shock, and the supports had to give way, thus breaking the explosion chamber throat and allowing the cylinder to drop. While there was no conclusive evidence to show whether the electrical puncture encountered on the throat bushings was caused by mechanical failure, there is a slight preponderance of evidence that would show that mechanical failure preceded electrical failure. Following out this theory a new assembly for the explosion chamber parts, including the insulating shield, was worked out: New features are, first, that the insulating cylinder is supported at the bottom again by means of fibre screws, but tapped directly into the steel pot and kept quite separate from the explosion throat; further, the number of these supporting screws was increased from six to twelve, and an entirely new part was installed, consisting of two wooden rings, one at the top of the steel pot and the other at the bottom, exactly filling the space between the inner insulating cylinder and the steel at these two points, thus taking all cantilever strain off the lower end of the cylinder. These two upper and lower wooden rings are joined together by several connecting wooden uprights making a rigid structure.

With these changes carried out the third series of tests on the 136B breaker was carried out. No distress was apparent on any of the shots, only a slight trace of smoke being visible, and no oil being thrown. Samples of oil drawn from the middle of the tanks and tested for dielectric strength averaged 15 kV, against approximately 30 kV obtained for the original oil. In view of the fact that the breaker handled a total of 30 shots without any inspection or even a change of oil, that on 18 shots the duty was not far below the actual rated interrupting capacity, and the excellent condition that the contacts were in at the end of the tests, it does not appear rash to state definitely that the breaker was fully adequate to meet its guaranteed rupturing capacity and that the troubles in the explosion chamber encountered in the early tests were completely eliminated by the new assembly.

Reviewing the tests on the Brown-Boveri breakers, the authors say it can be stated that in the case of the 150-kV breaker tests the following benefits were obtained:—

1. While the question was not definitely determined in the affirmative as to whether a multi-break breaker could be designed and built to handle successfully rupturing capacity of the order of 1,000,000 kVA, it is believed that the performance of the breaker when rupturing a short circuit of the order of 75 per cent. of that value was such that there appeared no doubt that the limit of the rupturing capacity of the breaker had not been reached.

2. Definite information was obtained as to the ability of the breaker to go through a cycle much more severe than the standard duty cycle. It was shown that for the system in question, if operating conditions called for it, the breaker tested could be plugged in on a short circuit four or five times in rapid succession with perfect safety.

3. In all, 26 short circuits were placed on the 132-kV system, of which 13 were at approximately full system capacity. So far as is known no appreciable damage of any sort resulted to the system.

4. Until the carrying out of the tests in question no check was available as to the system short-circuit capacity; the tests demonstrated that the system calculations were correct at least to within 10 per cent.

In the case of the 37-kV breaker of the Brown-Boveri type, the principal benefit obtained was, of course, a complete demonstration that the designer had completely missed his mark in giving the breaker a guarantee of 250,000 kVA; further, it indicated that perhaps under no conditions would it be possible to build economically a single-tank type breaker for that voltage and the rupturing capacity in question, namely, 250,000 kVA.

As regards the Reyrolle test, the benefits obtained can be summarised as follows:—

1. It gave confidence in the original decision to install this equipment, although, so far as was known, no equipment of that type had at that time been placed in service in America, though it is widely used on the Continent, and particularly in England.

2. The design itself showed that the originally proposed system of baffling, which consisted of wooden linings with wooden barriers fastened to the linings, was inherently weak, and was not advisable for breakers that were expected to rupture even such a moderate amount of power as 75,000 kVA.

Coming now to tests of the General Electric Co.'s breakers:

1. They served as a very thorough check on the explosion chamber type of breaker, particularly on the assembly that was standard before the tests were undertaken, and demonstrated the complete efficacy of the remedial measures that were finally applied to overcome these difficulties.

2. A breaker of large capacity was subjected to a test very close to its rated values and on a cycle which might, on the basis of the present tentatively adopted standard for the derating of breakers for other than a standard duty cycle, be interpreted to have subjected the breaker to a duty considerably in excess of its rating. The test clearly showed, at least for the particular type of breaker in question, after certain changes had been made, that the guaranteed limit could be handled by the breakers successfully.

## Colour Lighting.

On June 21st a demonstration of colour lighting was given by Messrs. Holophane, Ltd., in the miniature theatre attached to their London showrooms, to members of the Illuminating Engineering Society. Some idea of the extent to which colour lighting can be used with advantage in the theatre, kinema, and so on, was given. Changes of scenery were effected merely by varying the colour lighting of the stage, and it was demonstrated how colour lighting on the screen could aid the rendering of a film. A particularly interesting part of the proceedings was the changing of the designs of the wall panels of the auditorium, showing how an entire change in the general appearance of the theatre might be brought about inexpensively by colour lighting.

# New Electrical Devices, Fittings and Plant.

**Readers are invited to submit particulars of new or improved devices and apparatus for publication in this Section.**

### A Surge Recorder.

Hitherto, it has been difficult to form an idea of the actual cause of a surge on a h.p. system because the ordinary standard surge equipment gives no indication as to when the trouble occurred, thus preventing the operating engineer from linking up the threads of the disturbance. To overcome this difficulty the instrument described below has been developed by MESSRS. FERGUSON, PAILIN, LTD., Higher Openshaw, Manchester, in conjunction with Mr. G. W. PARTRIDGE, London Electric Supply Corporation, Ltd. It gives a record of the times at which surges occur on any particular system. Early models of the instrument have been in use on the e.h.p. distribution system of the Corporation for twelve years, not only recording the rises in pressure, but to a large extent eliminating failures on the mains, transformers, and switchgear. A full account of its operation was given by Mr. Partridge in our issue of June 20th, 1924, p. 992. It is designed primarily for use in conjunction with the roller-gap and resistance-type of surge-arrestor equipment, and is inserted between the current-limiting resistance and earth. The movement consists of a brass bar, one extremity of which carries a spring-supported wheel which makes contact with a disk-recording chart. The bar is rotated by an 8-day clock located inside the instrument at the rear, and makes one complete revolution every 24 hours. A U-shaped bracket attached to the clockwork mechanism carries guides in which the bar rides, and a series of

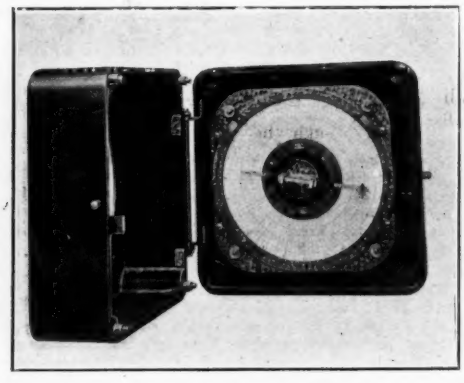

Fig. 1.—Surge Recorder, Front.

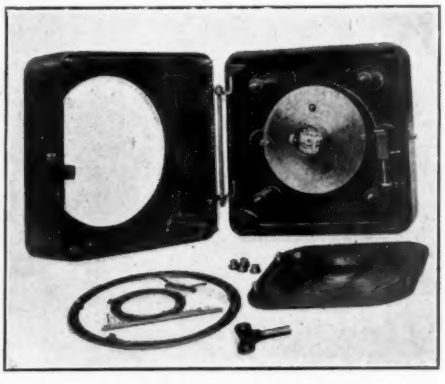

Fig. 2.—Dismantled Surge Recorder.

studs on the bar engage with these guides which give a lateral movement to the bar every 24 hours. Specially designed spring clips are screwed to a cross bar which is carried in further guides at the top of the bracket, the clips bearing upon the moving bar so as to ensure positive attachment to the clockwork mechanism, whilst permitting it to be easily removed when changing the chart.

The disk carrying the recording chart is supported on insulating pillars and connected to the current-limiting resistance by means of an insulated terminal projecting through the rear of the case. Consequently, when any surge takes place the potential of the disk rises and when a certain predetermined value depending upon the type and thickness of the chart used is reached, the paper between the disk and the contact wheel is punctured and burned away, the movement being permanently earthed. The chart, which lasts for one week, is marked with hourly and 20-min. divisions and sub-divisions. If no surges occur during the weekly period, the chart will not be marked and may be used again. To insert a fresh chart in the instrument it is only necessary to remove the contact arm and then unfasten an annular ring which fits over the metal disk and holds the chart in position. Suitable pins are provided for registering the chart. The clock can only be wound when the chart has been removed. The rectangular case of the instrument is a substantial aluminium casting, and is provided with a suitable window in front of the chart. The winding key for the clock serves also for locking the cover by means of four catches, thus preventing unauthorised operation and rendering the instrument dustproof. The instrument is also fitted with a sealing device. The clockwork mechanism is also permanently earthed. Figs. 1 and 2 show respectively front, with the cover open, and dismantled views of the instrument.

### A Novel Electric Sign.

Electrically lighted signs of the fret-cut copper and white-opal-background type suffer a disadvantage in use in that at an angle they are difficult, if not impossible, to read in the daytime, as it is not possible, it is claimed, to fit the metal front and opal back really permanently close together. Further, the centres of most letters have to be held in place by tie-bars, giving them a makeshift stencil-plate look, and finally they are very liable to distortion or destruction when cleaning is attempted. To overcome these and other disadvantages a new and very dignified sign is now being put on the market by Messrs. NUCYNES, 1, Upper Ground Street, Blackfriars, London, S.E.1. This is novel in construction; the letters, of unbreakable translucent material, are laid face downwards on a flat electro-conducting base, which is then hung in a copper depositing bath for some days. A copper plate is in this way formed with the translucent lettering embodied therein, providing an excellent sign face with a flush surface. In general appearance, in the daytime this sign is the exact counterpart of an ordinary bronze and enamel sign, while at night, when illuminated from behind the lettering, the effect is very pleasing. With a little light thrown on the front of the sign face the handsome copper-bronze base is also shown up. The lettering can be provided to show in various colourings or white during the day, and in other shades when illuminated at night.

### Double-Row Self-Aligning Bearings.

A recent development of MESSRS. RANSOME & MARLES BEARING CO., LTD., Newark-on-Trent, is a complete range of double-row, self-aligning ball journal bearings. These are not intended to replace the single-row bearings by the same makers, the dimensions of which stand for the new apparatus, but are recommended for comparatively lightly loaded shafts, or for cases where a considerable amount of mis-alignment is present. The new bearing can be supplied with either parallel or taper bores, with or without adapter sleeves, and also in the form of plummer or hanger blocks for the lighter forms of lineshaft duty. It will be seen from figs. 3 and 4 that the outer race has a spherically ground track upon which the balls are free to oscillate during rotation to counteract any untrue running of the shaft. The maximum number of balls of the largest possible diameter is incorporated, and the cage is of the one-piece type, made from hydraulically extruded brass of specified high ductility. Experience has proved that this type of cage gives greater efficiency than any other. The races

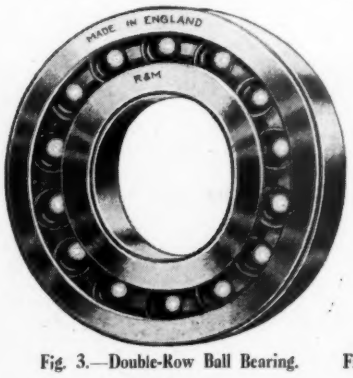


Fig. 3.—Double-Row Ball Bearing.

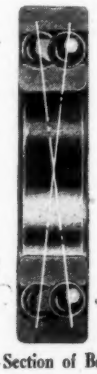

Fig. 4.—Section of Bearing.

are made from nickel-chrome-steel tubing to ensure homogeneity and to specifications imposing limits of variation to the constituent elements. It is claimed that there is no greater difference than .00002 in. between any two balls in one bearing. Particular attention is paid to the question of concentricity.

# The Lighting of Printing Works.

AT the meeting of the Illuminating Engineering Society, held at the Stationers' Hall on June 14th, a paper dealing with the lighting of printing works was read by Mr. H. C. Weston (Investigator to the Illumination Research Committee).

In the introductory part of the paper the author recalled that several codes of industrial lighting were in existence, and that the Home Office Departmental Committee on Lighting in Factories and Workshops, in its third report, presented a schedule of industrial operations classed as "fine work" (requiring not less than three foot-candles), and "very fine work" (requiring not less than five foot-candles). It was suggested, however, that investigations should be undertaken with the aid of joint industrial councils with a view to ascertaining the requirements of the chief industries, and some investigations on these lines, conducted by the Illumination Research Committee, were summarised in the paper.

The work selected for this investigation was type-setting by hand, a process which requires specially good lighting. Before discussing these data, Mr. Weston referred briefly to other researches, notably that by Ives on the effect of illumination on the process of letter-sorting in American post offices. A marked improvement in production resulted from higher illuminations, and the number of errors was less—being, for one group of operators, three times as many with three foot-candles as with 14 foot-candles.

The quality and output of compositors working under varied intensities of illumination have now been studied. The carrying-out of these difficult researches was greatly aided by the co-operation of the Joint Industrial Council for the Printing Trades of the United Kingdom. The results, summarised by Mr. Weston in tabular form, left no doubt as to the benefit of good illumination, both the output and the accuracy of work (judged by the number of "turned" letters) improving as the illumination was increased. The researches pointed to the conclusion that an illumination of the order of 20 foot-candles was necessary in order that the full degree of efficiency of work might be attained.

These experiments were all made by direct lighting, the same method being used throughout and only the intensity of illumination varied. Special care was exercised to avoid glare. Other experiments were subsequently made with indirect and semi-indirect lighting, and with daylight lamps.

Mr. WESTON suggested that a linotype or monotype worker required at least 10 foot-candles for the reading of "copy," and probably 20 foot-candles on the matrix of the machine. The cost of providing 20 foot-candles might appear formidable, but the lecturer showed that the cost would be amply justified by the greater output and freedom from errors resulting. There seemed to be some ground for believing that "daylight" lamps might prove useful, as the light was considered by compositors to be restful, but some difficulty was experienced in distinguishing old type. On the other hand, with new type the glitter resulting with a high direct illumination presented a difficulty, and this circumstance seemed favourable to the use of semi-indirect lighting.

In conclusion, Mr. Weston mentioned some experiences of the "linking-up" process in hosiery work, which was exceptionally fine. It was found that the use of magnifying glasses proved very helpful in this exacting work. The experience was quoted to show that if objects were too small or fine to be seen clearly by the naked eye, the trouble could not be removed by higher illumination. Thus workers were apt to blame the lighting for difficulty which was really occasioned by imperfect eyesight.

The discussion was opened by Mr. C. C. PATERSON, who warmly complimented Mr. Weston on his paper. Mr. HERBERT showed examples of some recent lighting installations in printing works, and Mr. A. E. HOLMES and Mr. A. E. GOODWIN (joint secretaries of the Industrial Council for the Printing Trades) expressed their appreciation of the great value of this investigation. The latter, however, suggested that recommendations to the printing trade should be confined to points on which opinion was unanimous; where experts differed it was naturally difficult to convince the consumer. Employers in the printing trade were extremely anxious to obtain the best possible conditions of illumination. Amongst others who joined in the discussion were Mr. F. C. Raphael, Mr. S. B. Langland, Mr. W. M. Bower, Mr. W. J. Jones, and Mr. L. Gaster. Some attention was devoted to the comparative merits of general and local lighting, an illumination of 5-8 foot-candles for general illumination, supplemented by up to 20 foot-candles on the actual work, being recommended. Mr. Gaster and Mr. Bower also dealt with the problem of the lighting of printing machinery, the former suggesting that appliances facilitating the use of local lights should be incorporated as an integral feature of the design of the machine.

The Chairman, in winding up the discussion, paid a tribute to the very sympathetic attitude of the printing industry, whose aid in this investigation had been most valuable.

# Correspondence.

*Correspondents should forward their communications* **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

### The I.E.E. Wiring Regulations.

With reference to the concluding words of your editorial on page 1002 of your issue last week, I would say that if you care to send your representative to West Ham I shall be pleased to show him a large number of installations complying strictly with the Regulations.

**Fredk. W. Purse,**
*Engineer and Manager.*

Electricity Department,
West Ham, *June 27th*, 1927.

### Cheaper Wiring.

Referring to the looping of heating sockets, for five years I have had six 15-ampere heating sockets wired on one circuit in this way; two are in the kitchen, the rest in bedrooms. The circuit is protected by a single-pole 15-A Zed fuse, which has never been blown except by short-circuits in the flexible to an iron or a kettle. The apparatus available for use on this circuit include three radiators (one 2-kW, two 600-W), two 1.2-kW kettles, a coffee-jug, a 400-W iron, a 600,W UV arc lamp, and a variety of appliances of lower wattage; no restrictions are placed on their use. The circuit is perfectly safe and satisfactory, and has never given a moment's trouble.

**A. H. A.**

*June 28th*, 1927.

### The Electrification of Rural Areas.

The question of the electrification of rural areas has been referred to on many occasions of late at opening ceremonies and discussed at meetings. Special reference has been made in some cases to the large number of broken insulators on overhead line systems. It may interest some of your readers to know that I have under my charge a fairly extensive overhead-line system (high and low pressure) comprising about 12,000 insulators and shackles, and about 8,000 service insulators. On looking through the records of the maintenance costs and replacements I find that only two dozen have been replaced during the last three years. The positions of these are on main roads and commons and in outlying colliery villages. I do not, therefore, consider that objection to the use of overhead lines is warranted because of damaged and broken insulators.

**C. Jones.**

Chasetown, Walsall, *June 20th*, 1927.

### A Fact.

Lady of the house, complaining to a wireman (?) that her intermediate circuit (allowing control of lamps from three positions) did not function properly, was informed by him "that it hadn't had time to get round yet."

**A. P. Lundberg & Sons.**

London, *June 23rd*, 1927.

### Cutting Out the Factor.

America has taken the trouble to make it known that their cutting out the factor and going direct to the consumer has proved a complete fiasco, and like the big-hearted people they are, they do not hesitate to proclaim their failure and determination to return to their best friends.

It is very disconcerting to any industry to have hanging over it a section of manufacturers with implied and expressed desires to cut out the factors. The psychological effect is serious because it stimulates that power of attraction to overseas goods, and this state solidifies very quickly into action. Manufacturers then become irritated, and make themselves believe that their known attitude was correct, whilst all the time they are directly responsible for the creation of a condition which need never have come into being.

Harmony is the only possible state to develop trade. Outside this sphere there is disloyalty and unrest, and it is amazing that any reputable firm could transgress this fundamental law.

Let it be said in justice to the factors in the electrical industry of Gt. Britain that they are a strong, virile, intelligent body of men, who, through the ages have laboured incessantly for the crowning glory of electricity. And to-day their efforts are revealed in the evolution which is taking place throughout the land.

These factors are known all over the country. Their combined representatives go into every nook and cranny of our land and keep in closer touch with the contractor and retailer than can the manufacturers. Their service is equal always to the manufacturer's, for they can specialise in selling and distribution methods independent of manufacturing problems, and obtain a wider distribution for his goods. This eliminates expense in handling small orders and reduces selling expenses. Factors stock goods in dull times. They have better facilities

of handling small accounts, thus enabling the manufacturer to concentrate his accounts.

America has discovered what all this means and is not ashamed to confess it.

Now that the electrical industry stands at the threshold of a vast expansion in its business, nothing would stimulate greater confidence among factors than the manufacturer's assurance that he will stand by our factors and refuse any overtures to go direct to the public. This assurance is capable of effecting faith and trust and loyalty—attributes which are essential to progress and harmony.

**James W. McKay.**

London, *June 22nd*, 1927.

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### Cheap Electricity.

I have read Mr. G. E. Moore's letter to you dated May 30th, 1927, in which he refers to what he describes as "My plea for simpler tariffs" in connection with the supply of current to consumers.

I think for simplicity's sake it would perhaps be of interest to your readers if I gave a few examples of the actual results of the maximum-demand plus unit basis of charging, but before doing so I would like to refer you to a paper which I contributed to the Association of Mining Electrical Engineers, entitled "Electric Power Supply Companies' Agreements," dated February 21st, 1920.

*Example* 1.—*Colliery in the Midlands taking current from Power Company upon the following terms* :—

| | |
|---|---|
| Maximum-demand charge per kW per month, 13s. 4d. ... ... ... ... = | £8 per annum |
| Unit charge ... ... ... ... ... | 2d. |
| Coal adjustment charge—rise and fall in the price of coal over 10s. per ton ... ... | .02d. per 1s. |

The agreement also contains a clause that the consumers should pay for increases in respect of wages and price of materials brought about by Government action.

The account rendered by the Power Company under the above clause for a supply given for January, 1923, was at the rate of 1.7d. per unit, which it must be admitted is a prohibitive price, taking into consideration that it would not pay the consumer to take current at a higher price than about .5d. for work of this description.

The current in this case was for driving a compressor of 2,000 cu. ft. per minute, 100 lb. pressure; the motor being of 350 effective horse power.

*Example* 2.—*Large shipyard in North of England.*—The supply to this shipyard was upon the maximum demand plus unit basis at the following rate :—

| | |
|---|---|
| Maximum-demand charge per kW per month, 6s. 8d. ... ... ... ... = | £4 per annum |
| Unit charge ... ... ... ... ... | .33d. |
| Coal adjustment above or below 8s. 6d. per ton ... ... ... ... ... | .0216d. |

The cost of current per unit for the year 1923 upon this tariff, and with coal from 18s. 6d. to 21s. per ton, was as follows :—

| | |
|---|---|
| January ... ... ... ... ... | 1.923d. |
| February ... ... ... ... ... | 2.005d. |
| March ... ... ... ... ... ... | 1.539d. |
| April ... ... ... ... ... ... | 1.589d. |
| May ... ... ... ... ... ... | 2.012d. |
| June ... ... ... ... ... ... | 7.825d. |
| July ... ... ... ... ... ... | 4.138d. |
| August ... ... ... ... ... ... | 10.876d. |
| September ... ... ... ... ... | 12.573d. |
| October ... ... ... ... ... | 11.257d. |
| November ... ... ... ... ... | 5.213d. |
| December ... ... ... ... ... | 1.355d. |

The average cost for the year was 2.469d. per unit, which is a prohibitive rate for shipyard work.

The reason for the high rates in several months of the year was due to the shipyard being closed owing to strikes, but it shows very clearly the way the consumer suffers with agreements of this kind under such circumstances.

*Example* 3.—*Dry Dock in North of England.*—The pumping plant in connection with this dock consisted of two 280-kW motors for driving the main pumps, also motors for operating the machinery for the dock gates, two five-ton winches, and a forty-ton crane.

Assuming that fifty ships were docked per annum, that is, practically one ship per week, the cost under the proposals made by the Power Company for current would be at the following rate :—

| | |
|---|---|
| Maximum demand, per kW per month, 6s. 8d. ... ... ... ... ... = | £4 per annum |
| Unit charge ... ... ... ... ... | .33d. |
| Coal adjustment above or below 8s. 6d. per ton ... ... ... ... ... ... | .0216d. |

The cost per unit worked out at about 4d.; in other words, it meant a cost for current for pumping only of above £16 per ship.

It was finally agreed with the Power Company to adopt a flat rate of 1d. per unit.

*Example* 4.—*Steel works in Midlands.*—These works were equipped with electrical furnaces, and the consumption of current was approximately 1,000 units per ton of steel produced.

Under the maximum demand plus unit charge the cost of current rose to about 4.5d. per unit when the steel melting furnaces were not continuously at work, and also to an impossible price even when they were fully employed.

The agreement was finally made for current on a flat rate which made it possible to produce steel at a reasonable figure.

The great objection to the maximum demand plus unit charge is that unless the load factor is fairly high the cost per unit becomes so heavy that it is impossible to utilise it, and in many cases it would pay the consumer much better to continue the use of his old power plant than to adopt electric driving.

During times when business is bad and it is necessary to cut down expenses in every possible way the cost of current is so high that the cost of production of the manufactures of the concern is unduly increased.

In connection with maximum demand plus unit agreements the power companies frequently ask for a minimum payment per annum. Personally I see no justification for a payment of this kind, as the gas companies and water companies do not ask for such conditions.

The insertion of a clause in Power Companies' Agreements to the effect that the combined maximum demand and unit charges shall not exceed a definite figure per unit (apart from the coal clause adjustment) in any month of any year during the period of the agreement, would overcome some of the objections and would also provide a basis upon which any monthly shortage arising from a monthly minimum payment could be taken out in current by the consumer over the following, say 12 months.

There is also an inequality in the payments that are proposed; in a case which I have now under consideration the minimum payment for a shipyard with a demand of 200 kW is £1,000 per annum, whereas I have another agreement where, on a demand of 1,600 kW, the payment is only £750.

There appears to me no reason whatever why power companies with their huge reserves of spare power, and taking into account the diversity factor in connection with the supply of current to a large group of customers, can find any justification for such action, and under these circumstances there should be no difficulty in giving a graduated flat rate, or even a simple flat rate where the general requirements and load factor are known.

There is another point which is worthy of the consideration of consumers, and that is the charge made for current on the high-pressure side of the transformers instead of charging as the power companies did in the past for the actual current consumed on the low-pressure side of the transformers.

I have before me a glaring case in connection with the supply of current to a large engineering works in the North of England where four transformers of 350 kW were installed. No means were provided for switching the transformers in or out of circuit as required by the consumers, with the result that the transformer losses over two years which were paid for by the consumers were 15.47 per cent. of the total consumption, these losses rising to as much as 26 per cent. at times.

This, of course, is due to the no-load losses and also the losses due to the variations in load, and it therefore becomes important to consumers to take their supply of current measured on the low-pressure side of the transformers.

**W. C. Mountain.**

Newcastle-on-Tyne, *June 18th*, 1927.

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# Legal.

### Workmen's Compensation Case.

IN the Shoreditch County Court, on June 21st, before Judge Cluer, William Frederick Topley, an electrical wireman, appeared in connection with a claim under the Workmen's Compensation Act. He was employed doing some wiring at the Victoria Provision Co., at Coopersale Road, Homerton, on December 23rd, 1924, when he fell from a ladder, a distance of about 12 ft., on to his back. He did not become unconscious, but complained of pains in his back and head. He got worse and worse, and had now got into a neurasthenic condition. He had been paid 30s. a week compensation ever since he met with the accident, and it was now thought that the matter should be settled by a lump sum payment. The man was in the employ of the Hackney Borough Council.

Mr. A. E. Robinson appeared on behalf of the applicant, and Mr. Alton Kyflin for the respondents. It was now proposed to settle the claim for a lump sum payment of £450. It was explained that, according to the doctors, the man was suffering from traumatic neurasthenia. He was sent to a convalescent home at Southend, but as that did not seem to do him any good he was sent to a specialist, a neurologist at the London Hospital, who, after examination, expressed the opinion that the man would recover in the course of time, but a preliminary to his recovery would be a settlement of his claim. He was a member of the Electrical Trades Union, and the solicitor to the union had been watching the case very closely, and was of the opinion that the settlement was a good one.

In answer to Judge Cluer, Mr. KYFFIN said the injured man was 26 years of age, whereupon the judge said that the amount was obviously inadequate. He refused the application.

### Chester Corporation v. T. Nicholls & Co.

AT Chester Assizes, on June 23rd and 24th, the Chester Corporation applied for an injunction to restrain T. Nicholls & Co. from using the water at a certain water wheel on the River Dee.

The Corporation, it was explained by Mr. MONTGOMERY, K.C., was riparian owner of the north side of the Dee. Its hydro-electric works depended on a head of water, and the ultimate effect of defendants' action in not using a sluice was that water ran to waste.

Defendants claimed that to close the sluice gate would be detrimental to their water rights.

Mr. CHARLES J. LOMAX, civil engineer, said he had had the turbines at the hydro-electric works stopped, but that did not materially affect the level of the water on defendants' side of the river. In his opinion nothing that the Corporation had done had interfered with the silting up of the channel.

The hearing was continued on subsequent days.

### City of London Electric Lighting Co.'s Sub-station.

THE London Consistory Court, on June 25th, heard an application by the rector, &c., of the united benefices of St. Edmund the King and Martyr and St. Nicholas Acons for a faculty to permit the City of London Electric Lighting Co., Ltd., to use part of a disused churchyard for the extension of a transformer station. There was no opposition, but the London County Council was said to be taking time to consider the matter, and the hearing was therefore adjourned.

### La Radiotechnique, Ltd., v. Western Lighting Co.

MR. JUSTICE RUSSELL, in the Chancery Division on June 21st, had before him a motion by La Radiotechnique, Ltd., against the Western Lighting Co. for an injunction restraining the alleged infringement of trade mark in connection with radio valves and alleged passing off.

Counsel said that the defendants had agreed to consent to an injunction, and had paid an agreed sum of £20 in respect of costs. There was an order by consent for an injunction and delivery up of any infringing articles, and the motion was treated as the trial of the action.

# Published Specifications.

**Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.**

#### 1925.

31,010. "System for controlling self-oscillation in radio apparatus." Carborundum Co., Ltd. (Carborundum Co.). December 8th, 1925. (271,915.)

#### 1926.

2,369. "Variable electric condensers." B. Hesketh. January 27th, 1926. (271,920.)

2,421. "Electrical resistance thermometers." A. Bursill and Electroflo Meters Co., Ltd. January 27th, 1926. (271,921.)

2,504. "Apparatus for the electromagnetic separation of ores." A. Davies. January 28th, 1926. (271,924.)

2,582. "Electromagnetic firing gear for guns." H. G. A. Scott. January 29th, 1926. (Addition to 224,319.) (271,925.)

3,027. "Magnetos." E. C. R. Marks (Wico Electric Co.). February 2nd, 1926. (271,932.)

3,363. "Electric lamp holder locking devices." E. A. White (legal representative of J. C. White (deceased)). February 5th, 1926. (271,934.)

5,974. "Electric fuses." A. Reyrolle & Co., Ltd., and F. Coates. March 3rd, 1926. (271,944.)

5,989. "Electric discharge tubes." M-O Valve Co., Ltd., and D. A. Rankin. March 3rd, 1926. (271,945.)

6,044. "Hydro-electric power stations." Dr. G. Bauer. March 2nd, 1926. (271,946.)

6,114. "Treatment of natural fibrous material for use in or as electric insulating material." Standard Telephones and Cables, Ltd. (Western Electric Co., Inc.). March 4th, 1926. (271,948.)

6,115. "Automatic and semi-automatic telephone systems." Standard Telephones and Cables, Ltd., J. H. E. Baker and W. R. Moscrip. March 4th, 1926. (271,949.)

6,120. "Electric transformers." G. M. Wright. March 4th, 1926. (271,950.)

6,248. "Electron discharge devices." Standard Telephones and Cables, Ltd., and W. T. Gibson. March 5th, 1926. (271,960.)

6,250. "Electric accumulators." Alton Battery Co., Ltd., and C. C. Rattey. March 5th, 1926. (271,961.)

6,303. "Submarine signalling apparatus." R. W. Keay. March 6th, 1926. (271,962.)

7,288. "Protection devices for electric apparatus." Siemens Bros. and Co., Ltd., E. A. Petithory, and E. R. Garrod. March 16th, 1926. (271,973.)

7,543. "Apparatus suitable for the reproduction of acoustic effects." M. Graham, A. Graham (legal reperesentative of E. A. Graham (deceased)), and W. J. Rickets. March 18th, 1926. (271,976.)

7,884. "Electrical insulating compounds." A. E. L. Scanes and Metropolitan-Vickers Electrical Co., Ltd. March 22nd, 1926. (271,979.)

9,473. "Electric tumbler switches." G. H. Ide and R. J. Kaula. April 10th, 1926. (271,991.)

10,149. "Control of dynamo-electric machines." English Electric Co., Ltd., and W. E. M. Ayres. April 17th, 1926. (272,001.)

10,400. "Electro-therapeutic device." S. S. Ebel. April 20th, 1926. (Convention date not granted.) (250,987.)

10,606. "Starting of synchronous dynamo-electric machines." H. O. Burge, R. A. Lochner, and Crompton & Co., Ltd. April 22nd, 1926. (272,006.)

10,778. "Indicating or measuring devices for high-frequency currents." Dubilier Condenser Co. (1925), Ltd. October 8th, 1925. (259,533.)

11,028. "Regulation of electrical generating machinery." A. H. Nicholson. April 27th, 1926. (272,009.)

11,429. "Electric magnetic switches operated by alternating current." Igranic Electric Co., Ltd., and J. H. A. Spaink. April 30th, 1926. (272,012.)

11,514. "Electric batteries." H. T. Harrison and G. Campbell. May 1st, 1926. (272,013.)

11,526. "Attachments for telephone instruments." H. Schein. May 1st, 1926. (Cognate application, 25,434-26.) (272,014.)

11,936. "Apparatus for the control of dynamo-electric machines." English Electric Co., Ltd., and R. A. R. Bolton. May 7th, 1926. (272,020.)

12,089. "Connection systems for automatic telephone plants." E. C. R. Marks (Automatische Fernsprech-Anlagenbau Ges.). May 10th, 1926. (272,022.)

12,580. "Electric current converting systems." British Thomson-Houston Co., Ltd. May 18th, 1925. (252,199.)

13,083. "Metal vapour rectifiers." Akt.-Ges. Brown, Boveri & Cie. June 2nd, 1925. (253,097.)

13,376. "Electric discharge tubes and apparatus for producing flashes." L. Seguin and A. Seguin. June 4th, 1925. (Addition to 248,743.) (253,101.)

14,168. "Electrical condensers." Dubilier Condenser Co. (1925), Ltd. June 5th, 1925. (253,135.)

15,404. "Telephone receivers." R. H. Dent and S. W. Bussell. June 18th, 1926. (272,042.)

15,405. "Electric switch combined with a telephone receiver." R. H. Dent and S. W. Bussell. June 18th, 1926. (272,043.)

17,235. "Methods of manufacturing electrodes for electron-discharge devices." International General Electric Co., Inc. July 13th, 1925. (255,090.)

19,186. "Electrodes for electric furnaces." Det Norske Aktieselskab für Elektrokemisk Industri. December 9th, 1925. (262,722.)

19,561. "Methods of electric arc welding." British Thomson-Houston Co., Ltd. (General Electric Co.). August 7th, 1926. (272,067.)

21,364. "Electric starting and lighting sets for internal-combustion engines." F. Munz. August 31st, 1925. (257,628.)

23,151. "Electric transformers." International General Electric Co., Ltd. September 22nd, 1925. (258,868.)

24,315. "Electric remote-control systems." British Thomson Houston Co., Ltd. October 1st, 1925. (259,234.)

24,675. "Marine cables." Siemens-Schuckertwerke Ges. October 6th, 1925. (259,571.)

25,314. "Electric discharge tubes and apparatus for producing flashes." L. Seguin and A. Seguin. October 14th, 1925. (Addition to 248,743.) (259,963.)

25,497. "High-tension electric transformers and the like." A. V. Tomlinson (E. Haefely & Cie. Akt.-Ges.). October 13th, 1926. (272,081.)

26,387. "Electric blasting fuses." J. Schurmann and Fabrik Elektrischer Zunder Ges. October 22nd, 1926. (272,082.)

26,433. "Multiple or built-up electrical condensers." P. R. Coursey and Dubilier Condenser Co. (1925), Ltd. October 22nd, 1926. (272,083.)

27,492. "Electric braking systems." British Thomson-Houston Co., Ltd. November 3rd, 1925. (260,392.)

27,613. "Luminous electric discharge tube." J. Brettmon. November 3rd, 1925. (261,002.)

28,717. "Sparking plugs in internal-combustion engines." P. Remund. November 15th, 1925. (261,413.)

30,860. "Electric regulating apparatus." British Thomson-Houston Co., Ltd. December 5th, 1925. (262,474.)

31,746. "Rectifiers for alternating currents employing liquid mercury." A. Latour. December 16th, 1925. (263,154.)

32,100. "Electrical circuit interrupters." Metropolitan-Vickers Electrical Co., Ltd. December 29th, 1925. (263,789.)

32,330. "Suspension or chain insulators." C. Lorenz Akt.-Ges. December 24th, 1925. (263,802.)

33,070. "Electric smelting furnaces." Akt.-Ges. Brown, Boveri & Cie. January 2nd, 1926. (263,872.)

#### 1927.

764. "Antenna systems." Standard Telephones and Cables, Ltd. (Bell Telephone Laboratories, Inc.). January 10th, 1927. (272,117.)

1,636. "Armature-actuating mechanism for magnetos." P. Brown. January 28th, 1926. (265,184.)

2,042. "Method of preparing piezo-electric elements." British Thomson-Houston Co., Ltd. January 28th, 1926. (264,878.)

7,947. "Electro-optical apparatus." Telefunken Ges. für Drahtlose Telegraphie. March 23rd, 1926. (268,348.)

8,135. "Method of, and means for mounting the component members of electric incandescent lamps or the like." Naamlooze Vennootschap Philips' Gloeilampen-Fabrieken. March 24th, 1926. (268,361.)

### Hendon Aerial Pageant.

For the third year in succession Marconiphone "Public Address" amplifiers are being employed at Hendon aerial pageant. Twenty-four loud-speakers are to be used for relaying music from the bandstand to the extremes of the Aerodrome, for describing each event to the spectators so that they may be able to follow the proceedings more easily; in addition, messages transmitted from machines in the air are to be received at three points within a few miles of the ground, amplified, and relayed over land lines to the main amplifiers, finally being broadcast to the spectators, who will thus be able to hear squadron leaders' orders and then see the resultant evolutions of the flight. Approximately fourteen miles of wire will be run to the various loud-speaker positions, and nearly 80 power valves will be required, of which 48 will be in parallel in six power banks comprising the last stage; each bank alone will require 360 volts from anode accumulators and will consume 250 milliamperes, and the total voltage of the anode accumulators in the amplifier room will not be less than 2,500. Low-voltage for the valves, microphones, and loud-speakers will necessitate the provision of approximately 50 large 6-volt car-type accumulators, and grid batteries will total over 600 volts, in 66-volt units. Large capacity charging boards are being fitted for keeping the accumulators up to full voltage, as the tests will last over many hours during the preceding week. The magnitude of the installation is emphasised by the fact that the apparatus and batteries alone, excluding the miles of wiring and pylons on which the loud-speakers will be mounted, will weigh over three tons and will require two large lorries for transport.

# New Work for Contractors.

**Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.**

*Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

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ABERDEEN.—Extensions at City Hospital (£50,350); city architect.

AYLESBURY.—Factory, Stoke Road, for Hunt, Barnard and Co., Ltd.

BEXLEY.—Four "all-electric" houses. Highland Road, for the U.D.C.; W. T. Howse, surveyor.

BILSTON.—Sewage pumping station, transformer house, &c., Willenhall Road; A. F. B. Sidwick, engineer, Town Hall.

BOURNEMOUTH.—Alterations, for Edwin Jones & Co., Ltd., drapers, Old Christchurch Road. Additions, Lancaster House Hotel, St. Swithin's Road; Mr. Jones. Alterations, Christchurch Road; Pearson, Cole & Shorland. Alterations, 62-66, Christchurch Road; Messrs. Wilsons. Alterations and additions, Curzon Hall, Boscombe Grove; Primavesi & Mauleverer. Church, corner of Jameson and Edgehills Roads; Trustees. Congregational Church, Sutton Road; Deacons. Extensions, highways depôts (£7,600); borough engineer.

BRIERLEY HILL.—Houses, for the U.D.C.; contractors, Pursehouse & Gregory (52), W. Willetts & Son, Ltd. (50), and Batham & Beddall (18).

BURSLEM.—44 houses, Collinson Square; Finney & Broadhurst. Billiard hall, Freemasons' Hall, Waterloo Road; Lodge Trustees.

CASTLE BROMWICH.—Kinema and billiard saloon (£25,000), for Morris, Jacombe & Sons, Ltd.; Harry Morris, 83, St. Oswald's Road, Small Heath, Birmingham.

COVENTRY.—Re-erection of works, Clay Lane, for Midland Light Car Bodies, Ltd.

CUPAR (FIFE).—Nurses' Home for Fife and Kinross District Board of Control (£15,000); the clerk.

DORCHESTER.—Municipal office accommodation, North Square; borough engineer.

EDINBURGH.—Conversion of Huntly House into Corporation Museum; Mr. Macrae, city architect. Home for Blind Women (£16,000); Rev. Dr. Thomas Burns, chairman of directors, Royal Blind Asylum and School, Edinburgh.

FALKIRK.—Suite of halls (£3,050), for Camelon Parish Church; the Minister.

FENTON.—Shop premises, Heron Street and Church Street; Burslem & District Co-op. Society, Ltd.

GLASGOW.—Infant schools at Shawlands Academy and Drumoyne; Master of Works, Education Authority, Bath Street. Additional block at Hawkhead Asylum, for Govan District Board of Control; the clerk. Institute for Y.W.C.A., 60, Bath Street; the secretary. Premises, 100-108, North Street; St. Andrews Ambulance Association.

GODALMING.—Secondary school; Surrey Education Committee.

GRIMSBY.—Re-erection of works, electrically equipped, for the Great Central & Co-operative Engineering Co., Victoria Street.

HAY GREEN.—Pumping stations (£16,428), for the Upper Stour Valley Main Sewerage Board; W. Willetts & Son, contractors, Kingswinford.

HELSBY.—Practical instruction centre (£2,797), for Cheshire E.C.; J. G. Davies & Co., builders.

HENSOL.—Mental institution; Glamorgan C.C.

HEREFORD.—Extensions to General Hospital, with electrical department (£72,000), for the Board of Management; Seager H. Evans, secretary.

HERNE BAY.—Alterations, Connaught Hotel, Marine Parade; D. Marsh.

HUDDERSFIELD.—Motor 'bus garage (64 cars); general manager, Corporation Tramway.

HYDE.—Extensions to secondary school, for Cheshire E.C.; F. A. Browne, county architect, Newgate Street, Chester.

KINGSTON.—Extensions, Technical Institute; Surrey Education Committee.

LONDON (BOW, E.).—Schools, Mile End and Wellington Street (£64,936); for the L.C.C.

(ILFORD, E.).—Offices and stores at cemetery (£6,000), for the City Corporation; C. B. Tarrar & Co.

(LEYTON, E.).—Extensions to headquarters, for Essex Territorial Army Association; secretary, Market Road, Chelmsford.

(LEYTONSTONE, E.).—Rebuilding the Green Man Hotel, Epping Forest (£20,000); the proprietors.

(POPLAR, E.).—Reconstruction entrance lock, West India Docks; Port of London Authority.

(SHOREDITCH, E.C.).—Additions, Shoreditch High Street; Barclays Bank, Ltd.

(CATFORD, S.E.).—Church, Bromley Road; E. Bowman and Sons.

(BATTERSEA, S.W.).—Public library, Southlands Estate; borough engineer. Seventh block of tenements, Plough Road; borough engineer.

(WIMBLEDON, S.W.).—Extensions, Technical Institute; Surrey Education Committee.

(CHISWICK, W.).—Bank, High Road, for Lloyds Bank, Ltd.

LIVERPOOL.—260 tenements, Melrose Estate; city engineer.

LLANDUDNO.—Nursing home, Gloddaeth Avenue; Dr. Coleman. Extensions, gas works (£22,000); U.D.C. gas engineer.

LYE AND WOLLESCOTE.—Additional housing scheme (100), Wynall Lane, for the U.D.C.; surveyor.

ORSETT (ESSEX).—Extensions to hospital, for the Joint Hospital Board; W. T. Green & Co., builders, London.

PEMBERTON.—School, Church Street (for 456 scholars); W. C. Ralph & Son, architects, Leaders Buildings, King Street, Wigan.

PORTSMOUTH.—Alterations, Shaftesbury Theatre, Kingston Road; H. J. Cook. Kinema, Basford Road; F. J. Spickernell.

PUDSEY.—Electrical installation for 96 houses at South Royd Park; B. H. Noble, borough surveyor, Town Hall.

REDHILL.—Extensions, Technical Institute; Surrey Education Committee.

REIGATE.—Extensions, Grammar School; Governors.

RUSHDEN.—Housing scheme (32), for the U.D.C.; surveyor.

SHOTTON (CO. DURHAM).—Catholic schools (£6,000); Arthur Harrison, architect, Stockton-on-Tees; C. Harrison, builder, Easington.

SKIPTON.—84 houses, Carleton Road housing site; J. P. Horne, clerk to the Council, Town Hall.

SOUTH AFRICA (CAPE TOWN).—Swimming and slipper baths, Maitland; J. Douglas, for Corporation. Parcels delivery depôt, Lowry Market; city engineer.

STOKE-ON-TRENT.—Hippodrome extensions; Wood and Goldstraw, architects, Tunstall. Extensions, infectious diseases hospital; Ball & Robinson.

STRETFORD.—Offices, Elsinore Road; Reinforced Concrete Construction Co. Secondary school, Great Stone Street; Lancashire Education Committee. Works, Talbot Road; Leyland & Sons.

SURBITON.—Clinic for Surrey C.C.; Taylor & Son, Epsom.

URMSTON (NR. MANCHESTER).—Secondary school; S. Wilkinson, county architect, 16, Ribblesdale Place, Preston.

WAKEFIELD.—Electric light installation, Housing Department; city architect Electric light installation, Belle Vue School; Education director. 60 houses, Thornes Road; city architect.

WARRINGTON.—36 houses, Bruche estate; D. Cooper.

WEMBLEY.—Film studio; British Authors' Productions, Ltd.

WINCHESTER.—Extensions, Royal Hampshire County Hospital (£12,000); Young & Hall, architects, 17, Southampton Street, Bloomsbury, London; Pitcher Construction Co., builders.

WOLVERHAMPTON.—Artificial silk factory for Courtaulds, Ltd., Coventry.

WORCESTER.—Rebuilding St. George's day schools (£5,000); Norman Parker, architect. Offices for Education Department; Worcestershire C.C.

YOKER.—Hospital extensions; Renfrew and Clydebank Joint Hospital Board.